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Government of Kerala

REPORT OF THE COMMITTEE TO STUDY AND ANALYSE THE EFFECTS OF AERIAL SPRAY OF ENDOSULFAN IN THE CASHEW PLANTATIONS OF PCK LTD. IN KASARAGOD DISTRICT

November 2001

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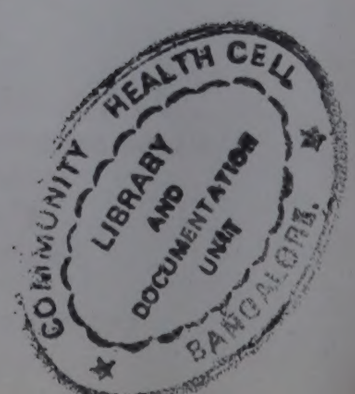

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SUMMARY

The Plantation Corporation of Kerala Ltd. (PCK) has been resorting to aerial spraying of the pesticide endosulfan for about 2 decades, 2 to 3 times an year, in 4696 ha. of cashew plantation owned by it in Kasaragod district of Kerala for the control of tea-mosquito bug. From 1979, there have been press reports on health abnormalities in the region adjoining the plantation. From 1998, there were isolated protests against the spraying of endosulfan. Protests gathered momentum after the latest spraying in Dec. 2000 and the media began highlighting the problem. The Government of Kerala received several representations regarding the pollution caused by the spraying of endosulfan in the cashew plantations of PCK Ltd. in Kasaragod District. Consequently, the government appointed a Committee to undertake a 'detailed study and scientific analysis on the effects of endosulfan on human population and environmental pollution'.

The Committee visited the plantations, took evidence from Government officers, experts, institutions, organizations and individuals who are concerned with the problem. The Committee analyzed all the available data.

The Committee came to the following conclusions:

1. The undulating nature of the land and the presence of large number of water bodies and human habitation in and near the plantations make the area unsuitable for aerial spraying of pesticides.

2. The protocol for aerial spraying of pesticides was not strictly followed by the PCK.

3. The same pesticide was repeatedly used for about 2 decades against the recommended practice of rotating different pesticides.

4. There was no arrangement to see whether the protocol was followed and to monitor the effects of spraying.

5. There is widespread complaint among the local people about the aerial spraying of endosulfan.

The Committee recommends the following measures to be adopted.

1. Ban aerial spraying of pesticides in all the cashew plantations of PCK Ltd. in Kasaragod District.

2. Since continuous use of any pesticide is not recommended by research organizations, use of endosulfan, which has been applied continuously for about 2 decades, should be frozen for 5 years in the cashew plantations of PCK Ltd in Kasaragod district.

3. Enforce a pesticide holiday for 5 years in the Perla Division of the PCK plantations (783.14 ha.). These plantations should be left to nature. The degree of tea-mosquito bug infestation and the productivity should be strictly monitored during these years.

4. The question of resorting to need-based manual or ground level power-operated spraying of pesticide in the other plantations of PCK should be decided in consultation with the cashew research organizations like the Kerala Agricultural University and the National Research Center for Cashew, Puttur.

5. The plant protection and pesticide management of the PCK Ltd. are unscientific and unsatisfactory. These are to be rationalized on sound scientific basis, on the advice of research organizations.

6. Research efforts to evolve integrated pest-management should be augmented.

7. Breeding programs to develop cashew varieties resistant to tea-mosquito bug infestation should be undertaken.

8. Since the factors leading to the high morbidity rate in Padre village of Enmakaje Panchayath and other areas adjoining the cashew plantations of PCK Ltd. in Kasaragod District, could not be established through this short study, a detailed investigation involving scientists from different disciplines and organizations should be conducted.

9. Since most of the people in the area near the plantations, who complain about health problem, are from the poor sections of the society, the Government should make arrangements to provide special medical care to them.

10. Since cashew is an important export commodity item earning revenue to the State, undue publicity to the problem will be detrimental to the interests of the state. There should be transparency in the pest-control measures adopted by PCK Ltd. and other agencies managing cashew plantations. There should be strict technical supervision for all pest control measures besides the monitoring of their effects on the environment.

11. The apprehensions of the local people should be cleared by making them aware of all aspects of the problem.

1. BACKGROUND

The Plantation Corporation Kerala Ltd. (PCK) has been resorting to aerial spraying of the pesticide endosulfan 2 to 3 times a year for about 2 decades in its cashew plantations spread over 20 villages in the Kasaragod district of Kerala State. Several health problems are reported from the areas adjoining the plantations, especially from the Padre village of Enmakaje Panchayath. The reported health problems include headache, dizziness, nausea, skin lesions, birth abnormalities, epilepsy, cerebral palsy, mental retardation, infertility and several endocrine disorders. Reports of alleged endosulfan poisoning have begun to appear in newspapers from 1979 (Annexures 1, 2 and 3). A reference on the abnormal health problems in Padre village appeared in Kerala Medical Journal in Feb. 97 (Annexure 4). In Dec. 2000, there were agitations by the local people against the aerial spraying in Muliyar Panchayath. In February 2001, an extensive report appeared in the journal "Down to Earth", published by the Society for Environmental Communication (SEC) from New Delhi (Sopan Joshi : Children of Endosulfan - Down to Earth, New Delhi. Feb. 28, 2001, Vol. No. 19), alleging endosulfan to be the cause for the abnormal health problems in the area. The Government of Kerala received several complaints on the matter (Annexures 5, 6). The Government also received a communication dated 07-02-2001 from the Directorate of Cashew nut & Cocoa Development drawing the attention of the Director of Agriculture to the letter F. PA 9 TECH ADV. 2001 dt. 25-01-2001 of the Director of National Research Centre for Cashew (NRCC), which contained a request to stop aerial spraying till conclusive evidence on the safety of endosulfan is confirmed (Annexure 07). The Hon. Minister for Agriculture announced in the Kerala Legislative Assembly that a committee is being appointed to study the problem and suggest remedial measures.

The Committee was constituted through G.O. (Rt.) No. 353/2001/AD dt. 23-02-2001 (Annexure 8) with the following members.

1. Dr. A. Achyuthan, Environmentalist, Bilathikulam, Calicut - 673 006. (Chairman)

2. Sri. L. Sundaresan, Director of Agriculture (Convener)

2. Dr. K.P. Aravindan — Member
Associate Professor,
Dept. of Pathology
Govt. Medical College,
Calicut - 673 008

3. Dr. M. Abdul Salam — Member
Associate Professor & Head,
Cashew Research Station,
Kerala Agricultural University
Madakkathra, Thrissur

4. Dr. Samuel Mathew — Member
Associate Professor,
A.M.P.R.S,
Kerala Agricultural University,
Odakkali, Ernakulam Dist.

The Committee had its first meeting on 27-04-2001. The details of the meetings of the Committee are given in Table 01.

TABLE 01 - MEETINGS OF THE COMMITTEE

No	Date	Place	Business transacted
1	27.4.01	Madakkathra, (Cashew Research Station, KAU)	Preparation of the draft of terms of reference.
2	20.8.01	Kasaragode, CPCRI Guest House)	Finalised the schedule of action.Visited the plantations. Discussions with Dr. Y Mohankumar, Dr. Sreepathy, Sri Sreepadre. Visited the H.S. School a Vaninagar.
3	5.9.01	Kasaragod (District Panchayath Hall)	Hearing-Government officers Functionaries of District Panchayath and Gram Panchayaths and PCK Ltd.

6.9.01	Kasaragod (PWD Rest house)	Hearing - Pesticide Manufacturers & Formulators Asso. (PMFA). The other hearings scheduled for that day were postponed because of hartal in Kasaragod Taluk.
21.9.01	Kasaragod	Field visits of the Plantations
22.9.01	Kasaragod (District Panchayath Hall)	Hearing - Research Organisations, NGO's, public, workers of PCK.
13.10.01	Calicut (Directorate of Arecanut & Spices Development)	Discussion of the draft report
18.11.01	KAU, CRS, Madakkathara	Discussion of the draft report
22.11.01	KAU, CRS, Madakkathara	Finalisation of the report

In the meantime, the National Research Centre for Cashew (NRCC) decided to thdraw the recommendation of endosulfan for use in cashew cultivation (Annexure 09). ne Director, NRCC requested all cashew research stations to "kindly refrain from commending endosulfan spray for the control of pests in cashew forthwith" (Annexure)). In Aug. 2001. The Government of Kerala ordered that "the use of the insecticide ndosulfan in crops/plantations in Kerala is suspended until further orders" (Annexure 11). ne National Human Rights Commission (NHRC) has asked the Director of Indian Council Medical Research (ICMR) to study the effects of endosulfan on human population in adre village. This study is being done systematically by the National Institute of ccupational Health, Ahmedabad (Annexure 17). Studies have also been conducted by e Kerala Agricultural University (KAU) and the State Committee on Science, Technology Environment (STEC).

This Committee has taken into consideration all available data from the above udies before finalizing this report. The members of the Committee visited the plantations. ld discussions with local people, received oral and written depositions from government icers, representatives of PCK and PMFA, research organizations, functionaries of the st. Panchayath and Gram Panchayath, NGO's and the general public. All the available ta were analyzed and discussed and then, the report was finalized.

2 . ENDOSULFAN

History

The use of synthetic chemicals for pest control in agriculture has been projected as safe and as one without serious adverse impacts on the environment. The immediate economic benefits often prompted the users to ignore the warning signals. But of late, the hazardous nature of several synthetic chemicals has been discussed at length. In May this year, the UNEP has taken the lead to get a protocol banning 12 persistent organic pollutants (POP) signed by more than 120 nations. Endosulfan is not included in the list of banned POPs.

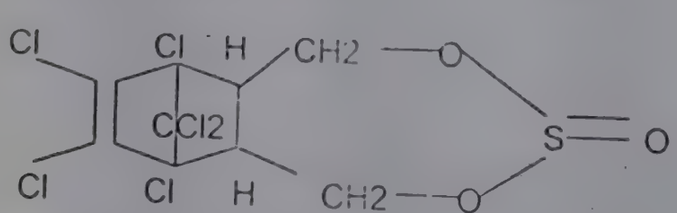
Endosulfan was made available in most of the countries from 1950.

Chemical Properties

Endosulfan formulations are marketed in several trade names like Thiodan, Endocel Acmaron, Endotex, Agrosulfan etc. It is an organochloride insecticide and acaricide. It acts as a contact poison in a wide variety of insects and mites. The reported chemical properties are given below :

Chemical name : 6,7,8,9.10,10 - hexachloro - 1,5,5a,6,9,9a hexahydro - 6,9 - methano - 2,4,3 - benzodioxathiepin - 3 - oxide

Structural formula : C9H6CL6O3S



Colour	:	Cream to brown
Smell	:	Like that of turpentine
Alpha to beta isomer ratio	:	70 to 30
Solubility	:	Virtually insoluble in water

Mode of action	:	Through contact, digestive system and respiratory system
Half life	:	7 to 50 days
LD 50 for rats	:	Oral 110mg/kg body weight Dermal 74-130mg/kg body weight

The Commercial endosulfan contains two isomers alpha and beta in the ratio of 70 to 30. The alpha-isomer is more toxic, the while beta-isomer is more stable and persistent. In the presence of oxygen, endosulfan will be oxidised forming endosulfan sulfate. Photo degeneration is fast (in 4 weeks). This break-down product, endosulfan sulfate, is more persistent than the parent compound and accounts for around 90% residue in 11 weeks. Sulfate formation increases as temperature increases (EXTOXNET, Endosulfan Data Sheet, Extoxnet, Ithaca, NY, U.S.A, Oct. 1992). The half life in water and in many fruits and vegetables is 3 to 7 days (Ghadiri H, et al - "Controlled Env. Study of the Degradation of E.S in Soils" in Challenging the Future - Proc. of World Cotton Res. Conf. Brisbane, 1994 & 95). In strong alkaline conditions, it degrades very fast (half life - 1 day). In contact with acids, endosulfan gets hydrolysed forming endosulfan diol and sulphur dioxide.

General Characteristics and Toxicity

Endosulfan was originally classified under cyclodienes. The other pesticides of this group namely aldrin, dieldrin, chlordane, heptachlor and endrin are banned in India due to high toxicity and long persistence. Many countries are phasing out these chemicals in accordance with UNEP convention resolution passed in May 2000. However, endosulfan is chemically unique by the presence of a sulphurous acid bridge attached to the hexachloro aromatic ring. The presence of this sulfurous acid bridge makes the molecule vulnerable to chemical and enzymatic degradation. All the degradation products of endosulfan are formed as a result of cleavage at this point. Because of this peculiar chemical nature of endosulfan, in the latest classification by the IUPAC and the WHO, it is classified as sulfurous acid ester of chlorinated cyclic diol.

Endosulfan is chemically close to dieldrin. The other well-known chemicals in cyclodiene sub-group are aldrin, endrin, dieldrin, heptachol and chlordane. All these except endosulfan are banned in India and are being phased out by many countries in accordance with UNEP convention [illegible] May 2000

Endosulfan is reported to be highly toxic to animals exposed to it. Alpha endosulfa residues have been detected in liver and brain tissues in rabbits, which died due to active exposure (Quijano R.P: "Applying the Precautionary Principles in the Risk Assessment o Pesticides", E.S. case study, Int. Jour. of Occupational Eng. Health, Vol. 06, No. 4, Oct. - Dec. 2000). Rueber has shown that endosulfan was carcinogenic in male and female rats (PNAP - E.S data sheet - Pesticide Action Network Asia & Pacific, Penang, June 1996).

Short-Term Toxicity

The W.H.O. has classified endosulfan in category II (moderately hazardous based mainly on the LD 50 value taken from the manufacturer - generated acute toxicity data (ATSDR - E.S. data sheet - Agency for Toxic substances & Disease Registry, P.H. Service, U.S Dept. of Health & Human Science, U.S.A, Sep. 1995). But the U.S. Env. Protection Agency (EPA) classifieds it as category 1 b (highly hazardous) (PNAP, June 1996). Short-term toxicity has been reported to be high and influenced by the solvents and emulsifiers used to dissolve it. Endosulfan is absorbed from the stomach, through the lungs and through the skin which means that all the 3 routes of exposure can cause hazard. Proper protective clothing including long sleeve shirts long pants, gloves, safety goggles and respirator are recommended while handling the chemical. Acute toxicity stimulation of the CNS is said to be main characteristic of endosulfan poisoning. Effects of acute exposure include hyperactivity, tremors, decreased respiration, salivation, anaemia and lack of coordination (Endosulfan Data sheet, Extoxnet, Ithaca, NY, Oct. 1992). Other signs are vomiting, diarrhoea, convulsions. People with low protein diets are more sensitive to the effects.

Chronic Effects

Very few studies have been reported on the long-term toxicity of endosulfan. Studies on animals have indicated that endosulfan may cause adverse effects on the immune system even at low levels of exposure (ATSDR - 1995). Endosulfan has been reported to cause mutations in animals (PNAP 1996). Endosulfan can cause chronic health problems and genotoxicity at least in animals. Acceptable daily intake of endosulfan for human being is 0.006mg/kg of body weight.

Limited information is available regarding the effects of endosulfan on the human immune system. However, specially designed studies using rats indicate that both

humoral and cellular immune responses are depressed by ingested endosulfan at doses that do not induce any overt signs of toxicity (Banerjee BD, Hussain QZ. 1986. Arch Toxicol 59:279-284). In vitro studies support the possibility that endosulfan affects immune system function (Das N et al Curr Sci 57:524-526). These results demonstrate that immunotoxicity may be a more sensitive end point of endosulfan-induced toxicity than other end points, and humans may be at risk for adverse immune effects following exposure to endosulfan.

Reproductive Toxicity

No information is available on humans to indicate that endosulfan affects reproductive function. Studies have reported that oral endosulfan had no effect on reproductive performance in rats (Dikshith et al. Ind Health 22:295-304). At higher doses than those used in these studies, adverse effects on the testes were observed in male rats that ingested endosulfan, but no assessment of reproductive performance was made (Gupta and Gupta. Toxicology 7:283-288). More recent studies that looked at possible effects of endosulfan on spermatogenesis found reduced sperm counts and sperm abnormalities in rats and mice in intermediate-duration studies (Khan and Sinha 1996 Mutagenesis 11(1):33-36). Testicular atrophy was observed in rats treated with relatively high doses of endosulfan in the diet for up to 82 weeks (NCI 1978 Technical Report Series No. 62).

Genotoxicity

No reliable data on humans exist to indicate whether endosulfan may act by a genotoxic mechanism. The results from available in vivo animal studies and in vitro studies are mixed, but generally provide evidence that this compound is mutagenic, clastogenic, and induces effects on cell cycle kinetics in two different mammalian species (Dikshith et al. 1978 Indian J Exp Biol 16:1000-1002; Dorough et al. 1978 Pesticide Biochemistry Physiology 8:241-252; Dubois et al. 1996 Environmental Toxicology and Pharmacology 4):249-256; Dzwonkowska and Hubner 1986 Arch Toxicol 58:152-156; Usha Rani and Reddy 1986 IRCS J Med Sci 14:1125-1126; Velazquez et al. 1984 Mutat Res 136 115-18). Recently Chaudhuri et al showed genotoxic effects of endosulfan in bacterial [illegible] reported that [illegible] Mutat Res 1999;[illegible]

In southeastern Spain, along the Mediterranean coast, extensive areas alongside residential zones are devoted to intensive farming in plastic greenhouses, with the use of large amounts of pesticides. Human tissue samples have been investigated for pesticide residues. Samples of fat from children living in farm areas contained a total of 14 pesticides. including endosulfan among others.

Scientists in the University of Granada, Spain studied the relationship between level of pesticide use and cryptochidism (undescended testis - which may occur as a consequence of hormone disruption) in these areas by looking at orchiopexy rates (ie. surgery for cryptorchidism) . Regression models showed that the strength of association between orchidopexy and level of pesticide use tended to increase with higher levels of use. (Garcia-Rodriguez et al. Environ Health Perspect 1996;104(10):1090-5; Olea et al. Toxicol Ind Health 1999;15(1-2):151-8)

The ATSDR (Agency for Toxic Substances and Disease Registry) review Sept. 2000 is the most comprehensive peer-reviewed summary that is available regarding the toxicity of Endosulfan till date. As is clear from the quotes below there is still much that is unknown about the chronic ill effects of Endosulfan on human health. However, it is abundantly clear that such effects on human population are not ruled out in scientific literature contrary to claims made by Pesticide manufacturers.

We do not know whether endosulfan has ever affected the ability of people to fight disease or has ever caused cancer in people. The Department of Health and Human Services (DHHS) (National Toxicology Program), the International Agency for Research on Cancer (IARC), and EPA have not classified endosulfan as to its ability to cause cancer.

One animal study suggested that after somewhat longer exposures, there is a possibility that the body's ability to fight infection may be impaired; however, this was not directly demonstrated.

The kidneys, testes, and possibly the liver are the only organs in laboratory animals affected by longer term exposure to low levels of endosulfan. The seriousness of these effects is increased when animals are exposed to higher concentrations of endosulfan. Because these effects occurred in animals, they might also occur in humans.

Some studies in animals have shown that endosulfan causes damage to the genetic material within cells.

It is not known if children's intake of endosulfan per kilogram of body weight is different than that of adults. It is also not known whether children differ from adults in their

susceptibility to health effects from endosulfan exposure. Whether endosulfan affects the ability of people to have children or whether it causes birth defects in children is also not clear.

Some studies show that large amounts of endosulfan damage the testes, but it is unknown whether such large amounts affect the ability of animals to reproduce. Pregnant animals given endosulfan by mouth had some offspring with low birth weight and length, and some with skeletal variations. Often, these effects were seen at doses where the pregnant animals themselves showed signs of poisoning by the endosulfan. Because these effects occurred in animals, they might also occur in humans.

It is not known for certain whether endosulfan or its breakdown products can cross the placenta, but it is likely that they can do so. Endosulfan has been found in human breast milk, but results of studies in animals that ate endosulfan while nursing their young suggest that only very small amounts of endosulfan can find their way into breast milk.

The above review indicates that the effects of endosulfan is totally dose- dependant and species- dependant. Specific evidence showing deleterious effects (short term and long term) of endosulfan on human beings at recommended doses of agricultural use is not available.

Environmental Effects

Safe levels of endosulfan in water are measured in ppt (parts per trillion). For example, the maximum level in water acceptable to the European Union is 0.001mg/lit. Endosulfan can cause fish kills even at recommended application levels. Because of this, endosulfan is not to be used over marshes and water bodies. Endosulfan is persistent in soil according to ATSDR report 1993(PNAP, 1996). Fish kills from endosulfan poisoning have been reported in Sudan (1988), Indonesia (1990-93), Philippines (1990).

Regulatory Status of Endosulfan

In Philippines, there was a long battle between the Government and the manufacturers (Hoecht) regarding the banning of endosulfan. In 1990, use of endosulfan 35% was banned, but endosulfan 5% was allowed to be used under controlled conditions. The manufactures started legal action against this and got the order quashed. In 1993, the ban was again implemented. Though legal action was initiated, the ban was confirmed in 1994, but exemption was given for pineapple farms. The other countries where partial or complete ban is in force are Denmark, Germany, Netherlands, Sweden, Belize, Singapore, Brazilian State of Rondonia. Its use in rice fields is not allowed in Bangladesh, Indonesia, Korea and Thailand. Its use is sevely restricted in Canada, Finland, U.K, Kuwait, Philippines, Thailand.

Table 02- REGULATORY STATUS OF ENDOSULFAN

Continent	Banned in	Severely restricted in
Asia	Tonga	Indonesia (banned in rice fields)
	Syria	Korea (do)
		Bangaladesh (do)
		Thailand (do)
		Philippines (allowed only for pine apple)
		UK
		Japan
		Khaskistan
		Kuwait
		Lithuania
		Sri Lanka
		Thaiwan
Europe	Germany	Denmark
	Sweden	Ugoslavia
		Netherlands

		Norway Finland Russia
South America	Brazilian state of Rondonia	Kenezuela
North America	US	Canada

But endosulfan is still in use in about 60 countries including USA, Australia, Japan, France, Israel and Korea. It is reported that the global consumption of endosulfan formulations is of the order of 50 million litres. The consumption in India is about 10 million litres.

FAO/ WHO REGULATIONS

Endosulfan was registered in India in 1965 along with several other pesticides based on the data on toxicological and environmental effects generated world over and as approved by the Codex Alimentarius Commission of the FAO/ WHO. Toxicological and environmental behavioral data generated subsequently on the pesticide was reviewed by the Joint Meeting of the FAO Panel of Experts on Pesticide residues in Food and the Environment and the WHO Core Assessment Group in 1989 and later in 1998.

In the 1998 meeting the joint committee examined the effects of the pesticide under the following heads.

1. Acute toxicity.
2. Short term toxicity (mice, rats)
3. Long term studies of toxicity and carcinogenicity (mice, rats, dogs).
4. Genotoxicity (mice).
5. Multi generation reproductive toxicity (rats).
6. Development toxicity (rats, rabbits).
7. Enzyme induction (mice).
8. Promotion (rats).
9. Immune toxicity (rats).
10. Neurobehavioral effects and neuro toxicity

11. Effects on sperm.

12. Endo crine effects

The effects depended primarily on the dosage and on the test organism. The group recommended the following levels that cause no toxic effect.

Table 03. ENDOSULFAN LEVEL WITH NO TOXIC EFFECT

Organism	Level that causes no toxic effect	Study on which recommendation is based
Mouse	3.9 ppm (0.58 mg/kg body weight/day)	Females in 78- week study of toxicity
Rat	15 ppm (0.60 mg/ kg body weight/ day)	2 year dietary study of toxicity
	75 ppm (6.0 mg/ kg body weight/ day)	Reproduction toxicity
	0.66 mg/ kg body weight/ day	
	2.0 mg/ kg body weight/ day	Maternal toxicity in a study of developmental toxicity
		Foeto-toxicity in a study of developmental toxicity
Rabbit	0.7 mg/ kg body weight/ day	Maternal toxicity in a study of developmental toxicity
Dog	10 ppm (0.57 mg/ kg body weight/ day)	1 year study of toxicity

After applying necessary safety factor, the FAO panel recommended the Acceptable Daily Intake (ADI) of 0-0.006 mg/ kg body weight for man.

Review of Regulations in India

The Ministry of Agriculture, Department of Agriculture and Co-operation, Government of India constituted a high power committee under the chairmanship of Dr. S.N. Banerji, Ex-Plant Protection Adviser to Government of India in 1991, for reviewing the use of endosulfan in India. All the available scientific data on chemistry, bioefficacy, carcinogenicity, mutagenecity, teratogenecity, neuro toxicity, epidemiological studies, foreign reports from WHO/ FAO, environmental impact, persistence in soil, water, crops, toxicity to birds, fish and honey bees, status of registration abroad and restrictions were studied. The committee recommended the continued use of endosulfan in the country, but specified that endosulfan should not be used near water-bodies and that this should be put

as a condition while issuing certificate of registration. R.B.Singh Committee appointed in 1999 also inssisted that labelling should be made mandatory in bold letters to avoid use of endosulfan near water-bodies.

The All India Co-ordinated Research Project on Pesticide Residues, being conducted in 17 research centers in the country, has generated residue data on endosulfan by carrying out multi-locational supervised trials under "Good Agricultural Practice " on cereal crops, pulses, oil seeds, cash crops, vegetables and other food crops (Annual Report of All India Coordinated Research Project on Pesticide Residues, 1999 ICAR, New Delhi). The waiting period (between spraying and harvesting) of endosulfan on vegetables is between 3 and 7 days and no detectable residues were found in the pulses, cereals and oil seeds at harvesting. The project also generated data on monitoring endosulfan residues in soil, water, fish, honey, vegetables, fruits, milk and milk products. In most of the samples, no detectable residues of endosulfan were reported and in samples where it was detected, the levels were below the maximum allowed limits. Of course these study did not inculde residues on cashew.

Use of Endosulfan in Kerala

PCK Ltd. has been spraying endosulfan over its cashew plantations from 1981. It is being used in the following crops in Kerala.

TABLE 04. CROPS FOR WHICH ENDOSULFAN IS USED

Crop	Strength %	Crop	Strength %
Cashew	0.05	----------	0.20
Cotton	0.07	Cocoa	0.05
Coconut	0.05	Tobacco	0.05
Oil Palm	0.20	Coffee	1.7ml/lit.
Cardamon	0.10	Tea	
Pepper	0.05	Rice	
		Colocasia	

(Kerala Agricultural [illegible] (1997) "Package of Practices Recommendation")

Endosulfan 35% EC is one of the several pesticides approved by the Directorate of Plant Protection, Govt. of India for aerial spraying on crops either by fixed wing aeroplanes or by helicopter.

A spraying protocol has been prescribed as per Insecticides Act 1968 and Insecticides Rule 1971 of the Government of India. The Central Insecticides Board is the Central Government Agency that regulates the use of pesticides in India. The designated licensing officers in the States issue lincences for sale, stocking and use of the pesticides. The State Agricultural Department is the licensing authority in the State.

The District Collector, Kasaragod, issues permission to PCK Ltd. for use of endosulfan as aerial spray subject to the conditions of the Act and Regulations. Copy of the proceedings of the Dist. Collector dt. 22-11-2000 is appended (Annexure 12).

The rule 43 of the Insecticides Rules stipulate the following conditions for aerial spraying.

1. Marking of the area shall be the responsibility of the operator.
2. The operator shall use only approved insecticides and their formulations at approved concentrations.
3. Washing, decontamination and first aid facilities shall be provided by the operator.
4. All aerial spraying should be notified to the public not less than 24 hours in advance through competent authorities.
5. Animals and persons not connected with the operation shall be prevented from entering the areas for specified periods.
6. The pilots shall undergo specialized training including clinical effects of insecticides.

The District Collector gives license on the following conditions.

1. Notice should be given to the public by the Corporation sufficiently in advance of the date of spraying. Notice should be displayed in all the village offices, Panchayath offices and ration shops in the area where spraying is done.
2. All the precautionary measures should be taken by the Corporation to prevent water pollution or health hazards to inhabitants in and around the Plantation and neighboring area as per rules and prevailing directions.
3. The Corporation should arrange to cover all wells, drinking water sources in and around the locality before spraying.

4. In the event of any death of cattle occurring in the locality due to aerial spraying, the corporation should arrange to get post-mortum examination conducted at its own cost and pay any compensation in case the death is found to be due to poisoning as result of aerial spraying.

5. This should also be brought to the knowledge of the local public by wide publicity so that the local public can report such death of cattle and awail the compensation in all eligible cases.

6. Mike announcement should be made in the area on the day previous to the date of spraying instructing people to take precautionary measures at the time of spraying.

7. The Corporation should by all means ensure that the spraying does not cause any environmental problems.

The Director, NRCC has also specified identical conditions for aerial spray. (Letter dt. 26-12-1997 form Director) (Annuxure 13). The Director NRCC has in his letter dt. 08-03-2001 stated that endosulfan has been continuously in use for more than 25 years in spite of other equally effective chemicals and that long-term exposure of a single pesticide is an unjustifiable practice (Annexure 9).

3 . THE CASHEW PLANTATIONS OF PCK

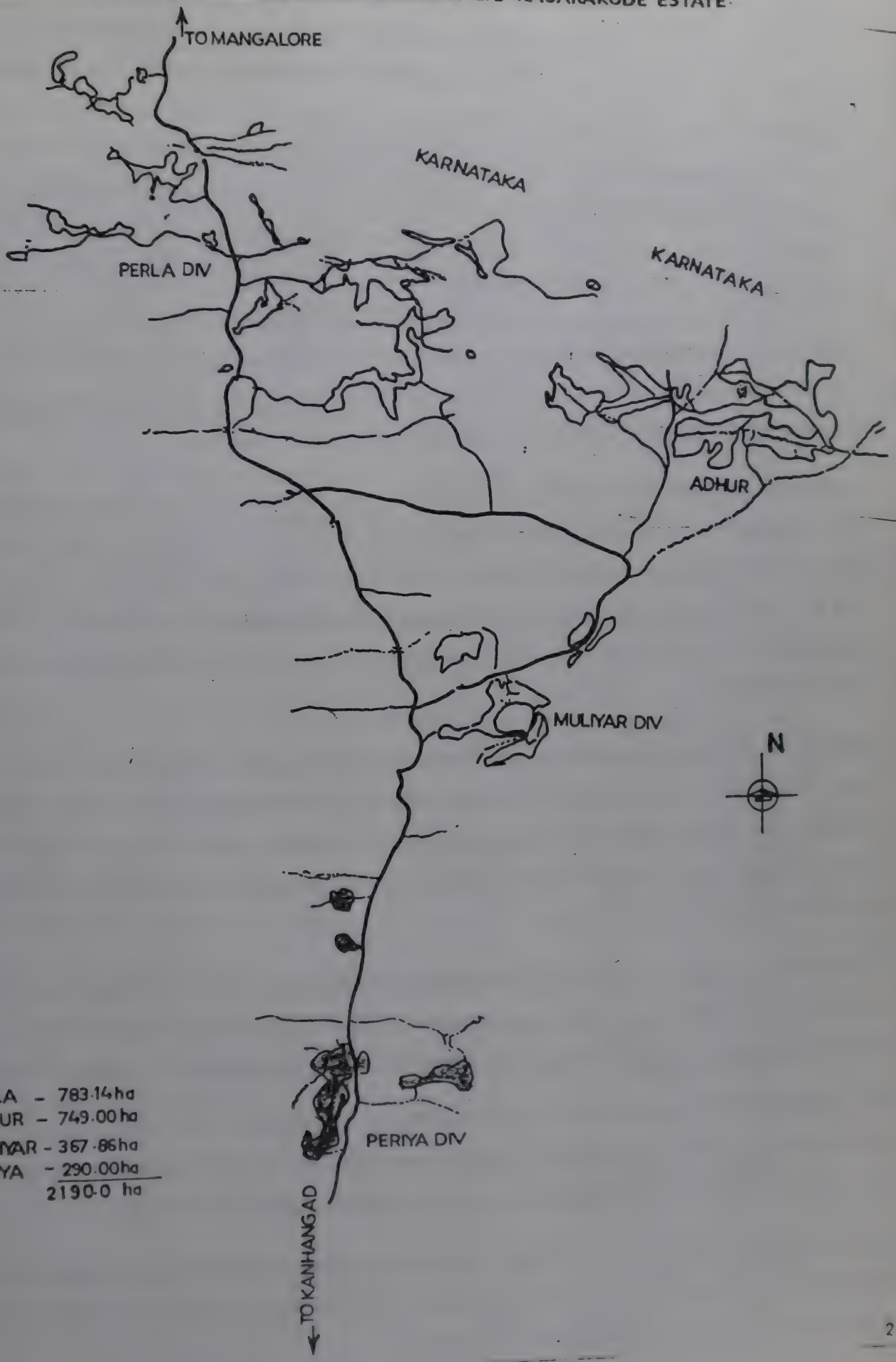
The PCK has 4696 ha. of cashew plantation in Kasaragod district, distributed in 3 sectors (as shown below) in 20 villages, as several fragmented plots :

1.	Kasaragod Plantation			
	a) Muliar Division	367.86 ha.		
	b) Perla Division	783.14 ha.		
	c) Adhur Division	749.00 ha.		
	d) Periya Division	290.00 ha.		
	Total	2190.00 ha.	:	2190.00 ha.
2.	Rajapuram Plantations			1526.00 ha.
3.	Cheemeni Plantations			980.00 ha.
	Total			4696.00 ha.

The plantations were under the Dept. of Agriculture until they were taken over by PCK in 1979. Endrine, Ekalux etc. were used till 1981 for pest control. Trial sprayings of endosulfan were done during 1977-1978 in the Kasaragod plantation. From 1981, aerial spraying of endosulfan alone is carried out 2 to 3 times a year. The cashew trees are mostly old ones, aged 35 to 38 years. There are no grafted trees except in the scion banks.

The land where the plantations are located is undulating. The soil is lateritic to a large depth. The cashew plantations are mostly on the hills while the valleys are inhabited by the local people. Several of the inhabited areas outside the plantations are surrounded by the plantation areas on 2 or 3 sides (vide location map). There are several houses inside the plantations of PCK and a large number of houses in the adjoining areas. Similarly, there are a good number of wells inside the plantation and also in the marginal areas. A table showing the number of house and wells is given in table 05.

THE PLANTATION CORPORATION OF KERALA LTD KASARAKODE ESTATE



- PERLA – 783.14 ha
- ADHUR – 749.00 ha
- MULIYAR – 367.86 ha
- PERIYA – 290.00 ha

2190.0 ha

Table 05. HOUSES AND WELLS INSIDE AND JUST OUTSIDE THE PLANTATIONS *

No.	Division	Land area ha.	No. of houses		No. of wells	
			inside	just outside	inside	just outside
1	Kasaragod	2190	210	1593	174	1333
2	Rajapuram	1526	36	225	3	18
3	Cheemeni	980	46	208	46	208

* Data supplied by PCK.

There are several schools inside the plantation areas. The water from the hills, forming the plantations, can reach the streams, some of which feed Chandragiri river, which provides drinking water supply to Kasaragod town and several panchayaths.

There are 160 workers in Kasaragod estate, 93 in Cheemeni and 158 in Rajapuram. Some of the labourers are staying inside the plantations. The workers are not covered by E.S.I. scheme. There are two health centres owned by the PCK, one attached to Muliar estate and the other to Periya estate. But there are no doctors in both. The workers go to other hospitals for medical treatments. Therefore, there is no record to verify the morbidity levels of the workers.

The aerial spraying of endosulfan is entrusted to outside agencies based on competitive bids. The PCK has no technically qualified staff to guide or supervise the spraying and to monitor the effects. The PCK issues routine notices before the spraying. A copy of the notice issued in one estate is attached (Annexure 14). The PCK gets permission for each spraying from the Dist. Collector.

The rights to collect the cashew nuts are auctioned every year. The production is not assessed and the actual crop is not quantified. The productivity is based only on the auction amounts. There is no means to verify the annual variations in the yield of the crop.

The spraying of the same chemical (endosulfan) 2 or 3 times a year went on year after year till Dec. 2000. No spraying has been done after Dec. 2000. There is no integrated pest management. The major pests are tea-mosquito bug and stem borer.

The PCK owns 340 ha. of cashew plantations at Mannarghat in Palakkad district. Aerial spraying of endosulfan is done here. The PCK has a smaller plantation at Perambra in Kozhikode district. No aerial spraying is done there.

4 . Investigation by the Committee

The members of the Committee visited the plantations to get a first-hand knowledge regarding the nature of the terrain, density of houses, schools, wells, water-courses etc. in and around the plantations. Since the Committee started its work only in August 2001, 7 months after the last spraying, there was no use in collecting samples of water, blood and soil for examining the residues endosulfan or its derivatives in them. Hence the Committee critically examined the data collected by other agencies. In addition to this, the Committee received written and oral depositions from Government officers, research agencies, experts, office-bearers of the District Panchayath and Gram Panchayaths, organisations and individuals. The list of persons who deposed before the Committee is given as Annexure 15.

The Committee went through the following reports of the Kerala Agricultural University.

1. Report on the visit of the expert team constituted for investigating the environmental effects of aerial spraying of endosulfan - Study Report 1 (Feb. 2001)
2. do - Study Report 2 (Aug. 2001)
3. Report of the Brain - storming Session on the use of Endosulfan for the control of tea mosquito in cashew held on 16-08-2001.

The Committee also examined the reports entitled "Children of Endosulfan" and "Toxic Tales from God's Own Country" that were published in the journal Down to Earth on Feb. 18, 2001 and Aug. 15, 2001 respectively. The Chairman wrote to the editor of the journal and Dr. Padma S. Nankar, who did the investigation, requesting to send information on the method used in the collection and analysis of samples. The reply received from the publishers of the journal is given as Annexure 16.

The Pesticide Manufacturers and Formulators Association of India forwarded to the Committee the report on the "Evaluation of Residues of Endosulfan" prepared by the Dept. of Pesticide Chemistry, Frederick Institute of Plant Protection & Toxicology (FIPPAT), Padappai, Tamilnadu for the PCK Ltd.

The Chairman contacted the Director of National Inst. of Occupational Health, Ahmedabad to know the status of their investigations. The reply received is given as Annexure 17.

The data were critically examined by the Committee. The critical assessment of the data is given in the next section

5 . CRITICAL ANALYSIS OF THE DATA

Since the last spraying was done in Dec. 2000 and the endosulfan residues dissipate fast, the Committee felt that collection and analysis of human and environmental samples by the Committee may not provide proper information in the effects of endosulfan residues. The Committee, therefore, critically examined the data generated by the following organisations :

1. Society for Environmental Communication (SEC) - Data and report published in the journal "Down to Earth" dated 28 Feb. 2001 and Aug. 15, 2001.

2. Frederic Inst. of Plant Protection & Toxicology (FIPPAT) published on 04 June 2001.

3. Kerala Agricultural University Study Reports prepared in Feb. 2001. and Aug. 2001.

1. SEC Report

The report published in Down to Earth created considerable stir as the residues of endosulfan reported to be found in water, human blood, soil, milk, leaves etc. were very high as given in table 06:

TABLE 06. ANALYSIS OF RESIDUE (DOWN TO EARTH Vol. 9, No. 19)

Sample	Detected value of endosulfan1	Maximum residue limit (MRL)2	Number of times value exceeds MRL	Site/source of sample
Water	1.18	0.18*	7	Small stream in Kumbdaje village near Padre
Water Padre	6.87	0.18*	38	Tank near the cashew plantation, Kajampady,
Water	9.19	0.18*	51	The Kodenkiri stream near Vaninagar, Padre
Butter	14.00	NA#	NA	From the milk of a cow of Saletadka, Padre
Cow's skin/ fat tissue	49.99	0.1	500	From the abdominal region of a cow from Padre
Cow's Milk	31.80	0.5	64	From a cow that grazes around Kajampady, Padre
Cow's Milk	57.20	0.5	114	From a stall-fed cow in Kumbdaje village
Coconut oil	17.00	NA	NA	Extracted from produce of trees in Vaninagar, Padre
[illegible]	[illegible]	NA	NA	From a tree in the plantation near Kumbdaje villa[illegible]

Vegetable	31.24	0.4-2.0	78-16	Basale; leafy, spinach-like vegetable, from Kajampad
Human Milk	22.40	NA	NA	Lalitha, 35, resident of Kumbdaje village
Human Blood	108.90	NA	NA	Vishnu Kulkarni, 16, has epilepsy & mental retardation
Human Blood	114.13	NA	NA	Prabhawati Shastri, 35, has asthma & skin allergies
Human Blood	115.19	NA	NA	Mohana Kumar, 40, has chronic throat infection
Human Blood	109.50	NA	NA	Kittanna Shetty, 21, has cerebral palsy
Human Blood mother	196.47	NA	NA	Muthakka Shetty, 50, Kittanna Shetty's
Human Blood	176.90	NA	NA	Lalitha, 35, resident of Kumbdaje village
Live Frog	10.35	NA	NA	From a small stream in Kumbdaje village
Cashew	3.74	NA	NA	From the plantation near Kajampady, Padre
Spices	212.28	NA	NA	Pepper bunch from Kajampady, Padre
Fish	28.24	NA	NA	From a tank in Kajampady, Padre
Soil	35.16	0.09*	391	From Lalitha's house in Kumbdaje village
Soil	3.17	0.09*	35	From a few metres inside the plantation at Kajampady
soil Padre	6.40	0.09*	71	From plantation area on a hilltop in Periyal,
Cashew leaves	6.52	NA	NA	From the heart of the plantation at Periyal, Padre

Note: All figures in parts per million (ppm)

1 : Values are the sum of a -endosulfan and b - endosulfan residues. Levels of endosulfan sulphate were not measured. Had this been done, the figures would have been higher.

2 : The MRLs are for the sum total of a - endosulfan, b - endosulfan and endosulfan sulphate residues. Calculated from documents of the US Environmental Protection Agency.

* : The MRLs for water and soil are the sum total of a - endosulfan and b - endosulfan residues, and do not include the MRL for endosulfan sulphate.

: MRLs not available (NA)

The validity of the data has been questioned on technical grounds. Dr H K. Handa, a renowned pesticide residue chemist has remarked that the procedure adopted by the SEC team appears to be faulty (Agriculture Today - June 2001). He says that

endosulfan and consequently the results reported by SEC should be verified by an independent residue expert. The study is contradictory in itself and the results obtained are highly questionable". In its communication dated Sep. 11, 2001, (Annexure 16) the SEC has explained the test procedure. The SEC has not tested for endosulfan sulphate. The tests were done in Centre for Science & Environment's Pollution Monitoring Lab under the supervision of Dr. P.S. Vankar, Head, Facility for Ecological Analytical Testing Lab, IIT, Kanpur. Dr. Vankar did not respond to the queries of the Chairman. The SEC reply has not been able to satisfactorily rebut the objections raised about their data.

Dr. E.V.V. Bhaskara Rao, Director, NRCC also has questioned the findings of SEC (Annexure 18). He has stated that "the procedure adopted certainly looks biased". He cites a research finding according to which the endosulfan residues are lost within 2-7 days in fruits and vegetable.

The values of endosulfan residues reported by SEC in the experimental samples collected from Padre are unbelievably high. The procedure is erroneous and validation of the data by alternate method (GC – MS) is not done. As such, data cannot be depended upon. The comments on the SEC report furnished by the Project Co-ordinator (Pesticide Residue), AICRP on Pesticide Residues, IARI, New Delhi (Annexure 22) also confirm this.

2. FIPPAT Studies

The PCK sponsored a study by FIPPAT. The investigators, were collecting environmental samples from the problem area. Therefore, they collected samples from other areas, which are subjected to aerial spraying. The major findings of this study are given below :

TABLE 07.RESIDUE LEVELS IN BIOLOGICAL & ENVIRONMENTAL SA PLES(FIPPAT)

Sample	Number	Residue
Water	36	Nil
Fish	1	Nil
Milk	1	Nil
H - Blood	106	Nil
H - Blood (C)	6	Nil
Soil	29	0.001 - 0.012 ppm
Cashew leaves	28	0.04 - 2.863 ppm

(Detection limit : 0.001ppm)

The samples were collected on 17 and 18 March, 2001. The studies did not indicate the presence of endosulfan in samples of water, human blood, fish and milk. Small amounts of residues were noted on samples of cashew leaves and soil.

Since the samples were collected on 17 and 18 of March 2001, about 21/2 months after the last spraying, high level of endosulfan residues cannot be anticipated, as endosulfan is degraded fast in animal tissues. High levels are not likely to be found in water as it is virtually insoluble in water.

3. KAU Studies

Three study reports of KAU were made available to the Committee.

1 Report of the visit of the expert team (Feb. 2001).
2 Report on the visit (6 to 8 Aug. 2001).
3 Report on Brain Storming Session on Use of Endosulfan held on 16 Aug. 2001.

The study team visited Perla and 4 other villages and interviewed members of 10 families. The team collected samples on Feb. 19, 2001, about 50 days after the last spraying for residue analysis. The samples were analysed separately in two different laboratories of the KAU (AMPRS at Odakkali and College of Agriculture, Vellayani).

Table 08. RESULTSS OF KAU STUDY

Matric	No. of samples	Total Endossulfan ppm
Water	5	Nil
Pepper berries	1	Nil
Betal leaf	1	Nil
Soil	5	0.05 - 3.80
Cashew leaves	3	0.50 - 0.80

The results given in Report I are shown in Annexure 19. No residue was detected in water. The residue levels are very low (0.055 to 0.315 ppm) in soils from adjoining areas, while they were comparatively high (up to 3.815 ppm) inside the plantation. On the cashew leaves also, the levels were high. These samples were collected on 19th Feb. 2001. In FIPPAT samples collected one month later also, residues were found only in soil and leaves, of course at a lower level. Qualitatively, these two studies agree

The team recommended the stoppage of aerial spraying in the area with immediate effect. They suggested that the current practice of scheduled spraying should be replaced by need based application following insecticide rotation.

In the second report also, the stoppage of aerial spraying was recommended. The summary of the other observations and recommendations of second report are given below :

1. There exists some unusual human health problem in the Padre village, but the cause-effect relationship is yet to be established.

2. A multidisciplinary team may take up this investigation. A project with a financial outlay of Rs. 4.5 lakhs has been proposed for such an investigation.

The third report was based on a brainstorming session held on August 16, 2001. Thirty-one scientists from different disciplines participated in this. Consensuses on eleven items were arrived at this session.

1. Even though, the scientists were very much concerned on the alleged health problems reported from Padre Village, there was no conclusive evidence to fix endosulfan as the whole cause of the problem.

2. In-depth studies are required in finding the cause of the alleged health hazards.

3. Studies on water pollution, heavy metal contamination and natural radioactivity of the area are also to be considered.

4. In the context of horrifying reports in the media, to be on a safer side, it is better to suspend the aerial spraying of endosulfan till conclusive results on the proposed investigations are made available.

5. Aerial spraying of all insecticides in the State has to be dispensed with since safety measures, though stipulated, cannot be followed strictly due to high population density and fragmented nature of plantations in the inhabited areas.

6. Only need-based manual or ground level power-operated spraying of the insecticide need be recommended.

7. Pest surveillance program has to be strengthened in order to make use of the application of insecticides need-based.

8. Endosulfan was in use in controlling the pests of agricultural crops during the last two decades and only on this account alone it is advisable to switch over to some other newer insecticide for the control of the tea-mosquito bug. Research programs are to be intensified in this line.

9. The possibility of using botanical insecticides for the control of the tea-mosquito bug requires immediate attention.

10. Cashew being an export oriented crop, too much publicity on the alleged reports without establishing the cause of the problem may be detrimental to the interest of the State.

11. Breeding programs to identify cashew lines resistant to tea-mosquito bug infestation require priority.

The Committee studied the above scientific reports available on the subject. Excepting the SEC report, none of the reports has found that endosulfan is the cause of health problems reported from Padre. No direct proof was available to book endosulfan as the causative factor.

6 . ANALYSIS OF THE WRITTEN & ORAL DEPOSITIONS

The depositions are classified into 8 broad divisions.

1. Government Officers
2. Functionaries of District Panchayath & Gram Panchayaths
3. Research Organisations
4. Officers of PCK Ltd.
5. Pesticide Manufacturers & Formulators' Association of India (PMFA)
6. Non-Government Organisations
7. Professionals
8. General Public
9. Workers of the PCK Plantations

1. Government Officers

The District Collector, Kasaragod, in his written deposition has stated that permission to use endosulfan 35% EC is granted to PCK Ltd. when requests are received for such permission. The permission order stipulates conditions for the aerial spray. But it is strange that the Dist. Collector has excluded the campus of Jawahar Navodaya Vidyalaya, the hospital premises of Kasaragod district, the Govt. Polytechnic campus, parallel college compounds and the LBS Engineering College campus, but not the high schools, L.P and U.P Schools and anganvadies. The Dist. Collector has stated that "the Corporation had conducted aerial spraying without taking proper precautionary measures and the spraying was conducted not within the stipulated period for which the permission was granted" (Annexure 20). He has stated that procedure to monitor the effects of spraying are being ascertained. This evidently means that there was no mechanism to monitor the effects at the Dist. Administration level. Based on the complaints against spraying in Enmakaje and Bellur Gram Panchayaths, the Dist. Collector has promulgated orders prohibiting aerial spraying from 21-08-2001.

The Deputy D.M.O in charge of D.M.O deposed that he has arranged a medical survey of 400 houses (population 3118) in Feb. 2001 as soon as he received a paper cutting regarding the health problems. The findings of the survey are as follows (Table 09).

TABLE 09. RESULTS OF HEALTH SURVEY BY D.M.O.

Total population covered : 3118

Health problems	Affected cases	Rate per 10,000
Mental retardation	9	28.8
Sterility	15	48.0
Abortions in last one year	9	28.8
Chronic diseases	20	64
Cancer cases	3	9.6

The DDMO remarked that the rate of mental retardation case is above the State average. He said that a more detailed study in the affected areas and a control area is required to assess the morbidity rate. Fish kills in Cheemeni have been reported but have not been confirmed. He also stated that health cases have been highlighted in Padre, because some doctors took interest to study the problem. In other areas, such interest was not taken. He also stated that the DMO is not informed when the spraying is done and, therefore, no monitoring is done by the Health Department.

From the above depositions, it is clear that the spraying was done in a routine and casual manner and there was no Government machinery to supervise it or to monitor the effects.

2. District Panchayath & Gram Panchayaths

Sri. Moideen Kunhi Kalnad, Vice President of District Panchayath in charge of the President and Sri. V.V. Rajan, Chairman of the Standing Committee deposed on behalf of the Dist. Panchayath. No written complaints have been received by the Dist. Panchayath, but they are aware of the problems. They stated that the boundary of spraying area is not clearly marked and proper precautions are not taken before and during the spraying. The Vice President remarked that the aerial spraying should not be done, but ground level power spraying can be considered. He also wanted the Government to take steps to remove the fear among the local people regarding the health problems.

From the Gram Panchayaths in the affected area, the following functionaries deposed before the Committee.

1. Smt. Mariyamma, President, Muliyar Panchayath.
2. Smt. Sarada. Y, President, Enmakaje Panchayath.
3. Sri. Kallage Chandrasekhara Rao, President, Bellur Panchayath.
4. Sri. [illegible], Vice President, [illegible]

5. Sri. K.B. Mohammed Kunhi, Chairman, Stg. Comm., Muliyar Panchayath.
6. Sri. K. Sathyanarana, Member, Bellur Panchayath.
7. Smt. B. Usha, Member, Bellur Panchayath & President Enmakaje Mahilasamajam.
8. Sri. Purushothaman C.V., Chairman, Stg. Comm. Bellur Panchayath.
9. Sri. Balakrishnan M.K., Vice President, Enmakaje Panchayath
10. Sri. M. Jayakara, Chairman, Stg. Committee, Karadka Panchayath.

All the functionaries remarked that necessary precautions are not taken by PCK before or during the spraying. The Pullur-Periya Gram Panchayath had raised apprehensions about the aerial spraying in 1997 itself. In Muliyar Panchayath, there were demonstrations against the spraying. The PCK Ltd. sought police help in Dec. 2000 for spraying. Representations were sent to the Dist. Collector and DMO. The Enmakaje Panchayath has passed 3 resolutions against the use of pesticides. All the representatives spoke about health problems in their respective Panchayaths. They also stated there are several streams and large number of wells in and around the plantations. There were several schools even inside the plantations. The students used to have headache, giddiness and nausea after the spraying. All the functionaries, except those of Pullur - Periya Panchayath, wanted aerial spraying of any type of pesticide banned. The representatives of Pullur - Periya were not against ground-level spraying. They stated that if the spraying is strictly limited to the Plantation area and all protocols are observed, even limited aerial spraying can be considered. The representatives of Enmajake Panchayath wanted the Committee to recommend compensation to the victims of health hazard.

3. Research Organisations

Scientists of two research organisations gave evidence before the Committee.

Dr. P. Sivarama Bhat, Scientist, NRCC, Puthur stated that as early as 1977, the NRCC had advised PCK Ltd. to rotate the pesticide, but PCK was using only endosulfan. Since allegations have been levelled against endosulfan as causing health hazard, aerial spraying has been stopped in Karnataka and Orissa. He also stated that aerial spraying of any insecticide is not advisable in Kasaragod Dist. Carabaryl and quinalphos are equally dangerous as endosulfan when applied as aerial spray. The NRCC advises need-based ground spraying. With regard to biological control, Dr. Bhat said that attempts to culture parasitoids in-situ have not been successful. The experiments with neem products also have not been successful. Dr. Bhat stated inter-cropping is not possible in old plantations. To the specific question whether endosulfan is the cause for the reported health problems,

Dr. Bhat said that he does not think so. There are no health problems reported from Karnataka State in areas under aerial spry.

In short Dr. Bhat does not recommend blanket spraying, but suggests need-based ground spraying rotating the chemicals.

Dr. E.V.V Bhaskara Rao, Director of NRCC forwarded his letter (Annexure 8) to Director, Cashew & Cocoa Development, Kochi and all other cashew research stations in which he has recommended the withdrawal of endosulfan in cashew plantations. He specifically mentions that long term use of a single chemical is an unjustifiable practice. In his e-mail communication dated 03-09-2001 posted to research groups, Dr. Bhaskara Rao has reiterated his earlier statement regarding "the safety of environment and health being more important than simple economics while adopting plant protection practices".

Dr. K.M. Sreekumar, Asst. Professor of Entomology, College of Agriculture, Padnekkad also deposed before the Committee. Dr. Sreekumar was in the study team deputed by the KAU. He is staying in a place which is only 1.5 km. from the Cheemeni estate. He is aware of the problem from 1998, when Asst. Agricultural Officer Smt. Leelakumari Amma filed a suit in the local court against aerial spraying of endosulfan. He has information that PCK Ltd. has started covering of wells only from 1986. It is not possible to cover tanks and streams in the area. In Cheemeny, there were local protests from 1990. Dr. Sreekumar was associated with a health survey conducted in 1998-99 by the KSSP. In the survey conducted by KSSP in Padre and Cheemeni, serious health problems have been seen in Padre, but in Cheemeny, the problems are of smaller dimension. During the spraying, those who are inside the houses do not have problems of headache and giddiness, but those who are exposed have problems. The plantation labourers also have similar problems. He stated that the PCK Ltd. advises the local people not to stir out of their houses for 10-12 days after the spray but this condition is impossible to be observed. The local people have to go out for work and the children have to attend the schools. Dr. Sreekumar stated that the height restriction regarding the spraying is not observed by the helicopters. To the question whether a pesticide holiday is warranted, Dr. Sreekumar stated that a holiday can be recommended only after studying the environmental parameters. He was of opinion that polyculture will help pest control. He also stated that if tea-mosquito bug is not controlled, fungal infection also will increase, as fungi will penetrate through the holes formed by tea-mosquito bug. To the question about the alternatives to endosulfan, Dr. Sreekumar said that he is not sure about it. This requires detailed study.

4. **Officers of the PCK Ltd.**

The PCK Ltd. was represented by Sri. Devapalan, Senior Manager, Calicut and Sri. Santhosh, Regional Officer.

To queries from the members of the Committee, the following answers were given.

1. Before 1983, spraying was done 3 times a year. After that, spraying is done twice a year. The spraying is done as per the directions of NRCC.

2. PCK Ltd. has 320 ha. in Mannarghat in Palghat Dist. There are no complaints about aerial spraying in that plantation. There is a small plot of 60 ha. in Alacode in Kozhikode Dist. where there are other crops in addition to cashew. No aerial spraying is done here.

3. Spraying of endosulfan started from 1980 in Kasaragod, 1983 in Rajapuram and 1984 in Cheemeni. Trial spraying was done from 1977-78 at Kasaragod.

4. The oldest plantation is in Periya - 1963-65.

5. There are no grafted plants. Grafted samplings are there only in scion banks.

6. There are 160 workers in Kasaragod estate, 158 in Rajapuram, 93 in Cheemeni and 37 in Mannarghat. None of them has abnormal health problems.

7. All necessary conditions regarding the spraying are met. PCK verifies the spraying. No complaint regarding the non-compliance of protocol has been received.

8. No study has been made by PCK on tea-mosquito bug.

9. PCK is not resorting to aerial spraying in Alakode estate in Kozhikode District, because there cashew is not a major crop.

10. There are no data regarding the actual annual production. The crop is not assessed before the auction. The yield increase due to spraying is 30% to 40%. This estimate in not based on assessment of yield.

11. Endosulfan is used continuously because it is the most economical pesticide.

12. The spraying is done by outside agencies.

13. Even though there are isolated tall trees other than cashew, the height restriction is observed.

14. PCK gives materials to cover the wells. Only small water bodies are covered. Streams are not covered.

15. The PCK has not tried ground level spraying. Moreover, it is not practically feasible.

16. In Aralam farm and in Karnataka and Goa, aerial spraying is done, even though there are habitations near these farms.

17. It is not possible to strictly monitor the height of helicopter. Only random check is done.

18. The cashew plantations of PCK are making profit.

19. The PCK has no experts for technical guidance. NRCC is approached for guidance, whenever necessary.

20. Other chemicals like carbaryl, monochrotophos etc. are not cost-effective.

21. There is a project for cashew apple processing, but it has not taken off.

To questions regarding specific complaints from local people in Vaninagar area, there was no reply. On the possibility of organic farming there was no specific reply. On the adverse effect of bad publicity arising out of continued aerial spraying of endosulfan on the international market of cashew, the officers evaded direct answer.

It was clear that the spraying was done in a casual matter. Without any technically qualified person under PCK's employment, the PCK's claim that supervision of spraying was done effectively does not stand to reason. All the functionaries of the Dist. Panchayath and Gram Panchayaths have testified that necessary rules for aerial spraying were not observed. No studies on tea-mosquito bug are made. The crop production is not assessed quantitatively. Still the PCK asserts that 30 - 40% reduction in crop will result if aerial spraying is not done. Rotation of chemical is not done because the other chemicals are costly. The officers do not know whether continuous use of the same chemical may lead to development of immunity by the bugs. The possibility of the bugs developing resistance is not considered but only the lower cost of the chemical is considered. The main reason for not resorting to aerial spraying in Alacode estate is given as the growth of different crops. The question whether the reason for this is that the biodiversity of the polycrops may have inhibited pest growth, there was no answer.

5. Pesticide Manufacturers & Formulators Association, Mumbai

The following persons represented the association :

Sri. Pradeep Dave, President

Dr. A.V. Dhuri

Sri. M. Raghavendra

Dr. A. Ramesh (FIPPAT)

Sri. Ganesan

Sri. Nair

The representatives agreed that the topography and fragmented nature as well as the large number of houses in and around the plantations makes it difficult to observe all rules regarding aerial spraying. They also agreed that the continuous use of the same chemical is not advisable. According to them, the issue is not the use of endosulfan but the use of pesticide in general. They said that all pesticides are specially formulated to harm the target insects most and to be safe to others. Endosulfan is the least harmful compared to others and most effective for use against tea-mosquito bug.

To the specific question whether the research on the effect of pesticides under controlled conditions are valid under uncontrolled field conditions, there was no specific reply. The representatives claimed that endosulfan cannot pass the placental barrier, but could not quote reference to any study to support that.

The representatives argued that by spraying from 7m height, the minimum risk level will not be exceeded. But as per rules, the spraying has to be done within 3m above the crop. They could not quote any study on the chronic effects on human beings. They did not give any satisfactory reply to the question on the effects of endosulfan on honey bees, especially during the foraging time.

Sri. Ganesan and Dr. Ramesh (FIPPAT) asserted that the Down to Earth data are not based on right procedure of testing. Since endosulfan is not water-soluble, the very high level of the chemical in water as given by the data cannot be trusted, according to them. Dr. Ramesh pointed out that data on sulfate residue are not given in the Down to Earth report. Dr. Ramesh suggested that the high residue level given in the Down to Earth article are due to diol formation. He said that it is likely that sulphuric acid was used is the treatment for the extraction of the samples causing diol formation. Unless diol formation is arrested, diol mediated error is likely to occur. He said that diol formation was arrested in the FIPPAT studies.

6. Non - Governmental Organisations

The following NGO's deposed before the Committee.

1. Kerala Sastra Sahitya Parishat (KSSP), Kasaragod Dist. Unit.
2. Thanal, Conservation Action & Information Network, Trivandrum.
3. Ban Endosulfan Dist. Co-ordination Committee, Kasaragod.
4. Endosulfan Spray Protect Action Committee (ESPAC), Periya - Padre
5. Kasaragod Jilla Paristhithi Samithi.
6. Indian Youth Congress (I), Pullur - Periya
7. Kasaragod Taluk Azad Cultural Centre.
8. Sri Sakthi Friends Club, Yethadka.
9. Vivekananda Yuvakendra.
10. Punchiri Club, Muliyar.
11. S.V. Brothers Club, Muliyar.
12. Mahilasamajam, Endumoole.
13. Kasaragod People's Forum, Nillipady, Kasaragod.
14. Farm Information Exchange Club, Yethadka.

The KSSP conducted house hold survey in 7 Panchayaths surrounding the plantations (Annexure 21). The survey revealed that safety precautions were not strictly adhered to by PCK. A good percentage of people surveyed in Enmakaje have reported about considerable reduction in small animals like frogs and insects like bees and fish kills. According to them, disability ratio in the entire area is high compared to the average for Kerala. Similarly, chronic morbidity in Enmakaje was also more than that for the whole of Kerala. The KSSP advocated a ban on aerial spraying of endosulfan, but did not object to ground spraying of other chemicals.

Thanal sent a copy of a study on endosulfan by one of its activists. It sent a dossier on endosulfan pollution in Kasaragod (Prel. Report I). It also sent a copy of its Report II on the Preliminary findings of endosulfan spray. Dr. C. Jayakumar, Coordinator of the survey, met the Chairman to hand over the report. The study gives information on the details on endosulfan and its effects on the environment. It also gives details on regulations on endosulfan in different countries. The Prel Report I is a dossier giving the background information on the impact of aerial spraying in Kasaragod. The Prel. Report II is a detailed study on the effects of human health. Several instances Of abnormalities of gastro-intestinal reproductive and neural system are cited in the report. 100 references are given

to prove the statements in the report. Thanal wanted the problem to be treated as one of human right violations.

ESPAC from Padre highlighted the health problems in Padre. The representatives drew the attention of the Committee to the observations made by the teachers of the Govt. H.S. School at Vaninagar on Jan. 03, 2000. before the media flare up of the problem started. They reported that most of the school children coming from the area exposed to endosulfan spray are physically and mentally ill. Later the NGO sent a white paper on the KAU Reports.

The group wanted a ban on endosulfan in the whole state, rehabilitation of the victims of aerial spraying and providing medical treatment to those who suffer from alleged endosulfan poisoning.

All the other NGOs were for stopping aerial spraying of endosulfan. They also mentioned about the growing resistance of the people to the endosulfan. They asserted that the health problem is not limited to Padre alone, but it is there in other areas like Pullur - Periya, Muliyar and other places also,

7. Professionals

Two medical doctors practising in the Padre area testified before the Committee.

Dr. Mohan Kumar has reported abnormal health problem in 1997 to the Kerala Medical Journal (Annexure 4). He said that the problem has a history of several years. In 4 sq. km of Padre village with a population of 2000, there were 51 cancer deaths in the last 5 years. These are from 126 houses near Kodenkeri stream. He has detected 4 new cases. The cancer was mainly that affecting blood and liver. A survey by an organisation called Link - Trada of Mangalore also showed 11 cancer deaths in 52 families during the last 5 years in the same area. The other abnormalities detected by Dr. Mohankumar are given below :

Mental Retardation	38
Psychiatric cases	49
Epilepsy	33

Similar abnormalities are recorded from Kumbdaje village also. A random survey gave the following results.

Cancer deaths	-	7
Psychiatric cases	-	9
[illegible]		

M.R	-	2
Congenital abnormality	-	4
Others	-	7
Total	-	35

The doctor said that skin allergy and asthma were common complaints in the area. He also said that the children in the schools in the affected area have giddiness, nausea and skin trouble after the spraying.

The doctor stated that high rates of infertility and abortion are reported. Four new cases of epilepsy and 11 new cases of paralysis have been reported from Patrone village in Karnataka State, due to spraying of endosulfan.

The doctor said that private cashew planters are not using endosulfan spray. Still their crop is not bad.

The doctor wanted total ban on endosulfan or any other pesticide. He urged detailed medical check-up, compensation to victims and fixing up the responsibility for the malady.

Dr. Sreepathy Kanjanpady said he is practising at Perla. His house is in Padre. He has observed the deaths of honey bees and frogs, immediately after spraying operations. Reptiles move away from sprayed areas. He has also noticed tremors in cattle. Reports of deaths of cattle exposed to spray have been reported. The acute health problems faced by the human beings are head ache, vomiting, giddiness and cramps. Some plantation workers have approached his clinic for treatment after the spraying. With 10 to 15 days after a spray, an increase in cases of skin lesions, visual problems and general debility are seen. The doctor himself got cramps on Dec. 26, 2000 when the last spraying was done. The characteristic smell of endosulfan remains in the air for 10 days in some low areas near the plantations.

Dr. Sreepathy cited a few typical cases:

1. Mr. Nair : Has psychological problems. His wife is highly anaemic, had 3 abortions. The couple has only one child; she is sick, has symptoms of non-secretary endometrium.

2. Sri G. Bairi : Asthma. Daughter gets fever, cough, wheezing. Son (10 months old) has the development of his brain stopped, has convulsions.

3. Sri. K.R. Rao : Leukoderma. Two daughters are childless. Son has brain tumour Nephew was an M.R.

The Doctor said that there are several families like this where all the members are sick. He wanted a moratorium on "testing the pesticides" on human beings.

8. Educational Institutions

Representations were received from several educational institution urging a ban on aerial spraying.

In the representations from Govt. Higher Secondary School, Padre, signed by 537 students, it was alleged that many students have nausea, bronchitis, eye troubles and skin allergies during and immediately after the spray. Many students are said to be suffering from growth retardation, fits, asthma etc. They showed a table indicating on decline in SSLC results over the years. The students wanted a total ban on endosulfan and provision of medical aid and rehabilitation for the victims.

In the representation signed by the Head master, 9 members of staff and 213 students of SVAUP School, Swarna, Padre, it is alleged that endosulfan is the cause of health troubles experienced by them. They wanted total ban of all pesticides for cashew and treatment for those affected.

The President of PTA of Govt. H.S. Bellur also gave a similar representation. In the memorandum signed by 8 teachers of GUP School, Pothankandam and in another one signed by 109 students of the eco-club of the same school, similar requests were made.

In another memorandum signed by the Principal, 6 teachers and 78 students of Academy Periye at Periya, it was alleged that endosulfan spray causes epilepsy, cancer, cerebral palsy. They wanted immediate stoppage of endosulfan spraying. The scout teacher and 2 student scouts brought a memorandum signed by HM of AUP school, Bovikkanam, which also contained similar requests.

It is clear from the above that the teachers and the student community are very much concerned abouSt the alleged bad effects of endosulfan spray and this was personally felt by members of the Committee, when they visited the GHS School, Padre.

9. General Public

Several representations were received from the general public, some of them directly and some of them brought by others. Some deposed orally before the Committee.

Sri. Shree Padre, Journalist, Vaninagar, had noticed abnormalities in Padre village form 1977-78. He published features about them in 4 journals, including Kerala Kaumudi in Malayalam, between 1979 and 81. He has produced copies of press cuttings of 3 of them (Annexures 1, 2 and 3). Sri. Shree Padre deposed that there are abnormalities among animals and human beings. He said that similar incidents have been reported from a village near Dharmasthala, where the Karnataka Cashew Development Corporation has been spraying endosulfan aerially from 1985. He said that the workers wash the empty cans of endosulfan in streams. In Jan. 2001, 200 farmers had sent complaints to PCK and the District Collector. Sri. Padre wanted total ban of aerial spraying of all pesticides, medical care and rehabilitation of the affected persons and compensation of the victims. He also wanted the responsibility for the problem should be fixed through an enquiry.

Sri. Shree Padre took the Chairman and Dr. K.P. Aravindan to the surangam in his estate. Surangam gets water filtered through layers of laterite. A large number of people in the area depends on surangam for their water supply. It was stated that some of the surangams are cut into hills which are sprayed with endosulfan.

Sri. Ravindran K.K and 61 others from Pullur-Periya raised apprehensions about the effects on health due to the spraying and wanted the spraying to be stopped.

Fr. Vincent DSouza, Parish Priest, Ukkinadka and 5 others, in their signed affidavits, described the adverse effects of endosulfan on human health, bees, vegetables etc. and wanted a ban on the spraying of endosulfan. Sri. Harinarayan S. of Kumbadje deposed that he was not generally using insecticides. Once when he used endosulfan, he experienced urinary troubles. He also wanted a stop on spraying of chemicals.

Sri. M. Sasidharan gave a representation signed by himself and 106 others of Athooty - Kuppamun Harijan Colony near the Cheemeny plantation. They have stated that they suffer several ailments due to endosulfan. They urged that this pesticide should never be used. Sri. M. Jayakara, Chairman of Stg. Committee of Karadka Gram Panchayath presented a statement by himself and 8 others which urged that human life should not be destroyed by using pesticides.

Sri. Krishna Moorthi, a farmer from Vaninagar and Sri. Venkatram Bhat from Padre in written affidavits stated that bee population has declined considerably in and near the PCK plantations. Sri. Govinda Bhat, teacher, Bovikkanam A.U.P. School stated that he has not used any pesticide in his farms. But he suffers due to the bad effects of endosulfan used in the nearby plantations of PCK. He is not able to pursue his honeybee business due to decline in bee population.

The following farmers deposed in writing that they do not use endosulfan, still they do not find any decline in cashew crop in their plantations.

1. Smt. Seethamma K, Padre
2. Sri. Babu Poojary, Vaninagar
3. Sri. Madhava Bhat, Padre
4. Sri. Y.S. Krishna Sarma, Kasaragod
5. Sri. A.K. Gopolakrishna, Padre village, Baipadithaya
6. Sri. Srikrishna Kashyap, Padre
7. Sri. C.A. Basheer
8. Sri. Govinda Bhat, Bovikkanam

But the following farmers wanted that the ban on endosulfan to be lifted. They asserted that they have not felt any bad effects, but have found endosulfan necessary and useful to control the pests.

1. Sri. K. Krishnan Nair, Kundadukkam, Cherkala
2. Sri. A. Shiva Sankar Rao, Karnataka
3. Sri. Gyanadeva Shenoy, Peredal, Badiyadukka
4. Sri. Thirupathy Kumar, Peredal, Badiyadukka
5. Sri. B Moideen Kunhi, Badiyadukka
6. Sri. Aravind P, Badiyadukka
7. Sri. Abdul Basheer C.A, Kasaragod
8. Sri. Sasi, Kappimala, Kannur

The hand writing in the representations 3, 4, 5 and 6 was the same and all the four representations were brought in one bench.

The Pesticide Manufacturers and Formulators Association also brought some representations in which it was stated that endosulfan is not harmful and it is beng used by the farmers.

The Committee received representations from the following persons for medical treatment/compensation. All the representations were forwarded to the Dist. Collector.

1. Sri. Hassan M.A, Kakkedettu
2. Sri. Muhammad, Bellur
3. Sri. Shyam Bhat B, Kirnivgar
4. Sri. Hukrappa Gowda, Bellur

It was noted that among those who deposed in writing and/or orally, a large number is from Padre, the village allegedly most affected by the spraying. A high degree of awareness was noted among them. From the depositions, it was clear that they are afraid that they are not safe from the reported health problems. It was stressed that the practice of spraying endosulfan started first in this area and, therefore, Padre area has been subjected to the longest period of exposure among the PCK areas.

From a detailed study of these depositions, the members of the Committee have found that the ordinary people are very much afraid about the alleged bad effects. They cannot find anything other than aerial spraying of endosulfan as an abnormal activity causing pollution in the area and, therefore, naturally connect this to their health problems. The lackasaidal approach of PCK to the spraying operations and the complaints has added to this.

10. Workers of PCK Plantations

The workers from PCK plantations deposed before the Committee.

1. Rajapuram Estate - Sri. P. Rajagopalan and 11 others
2. Perla Division - Sri. D. Mana Pattali and 24 others
3. Cheemeni Estate - Sri. K. Bhaskaran Nair and 4 others
4. Periya Division - Sri. Chavindiyan and 2 others
5. Adhur Estate - Sri. K. Narayan and 3 others
6. Muliyar Division - Sri. Kunhiraman and 3 others

Several of these were working in these estates for more then 30 years. Most of them are staying within the estate area with the members of their family including small children. All of them stated that there are no abnormal heath problems among them. They are not covered by E.S.I. There are hospitals in Periya and Muliyar, but Doctors are not posted in them. The workers said that they are given masks, gloves etc. But to the question whether they use them, the reply was that they will cover their face with towels. Their experience is that the cashew flowers will wither away if pesticides are not applied. According to some of them, the reasons for the peoples' complaint are land disputes and right of passage through the plantations.

The workers reported that endosulfan has no bad effects and hence, they themselves do not care to cover their own wells during the spraying. But they had asserted that PCK always to cover all the wells in the affected area. When asked how can they be serious

about covering others' wells if they themselves do not care to cover their wells, there was no answer.

The depositions by all the groups of workers were more or less similar. Though they said they had no health problems, several of them appeared to be highly anaemic. One of the leaders had his hands shivering.

The general opinion of the public was against aerial spraying of pesticide. Some of them did not oppose ground level spraying.

Out of the 19 villages subjected to aerial spraying, abnormal health problems were reported mainly from Padre village, Enmakaje Panchayath. Health problems were also reported from Muliyar and Pullur- Periya Panchayath to a lesser degree. But no cases from other sprayed areas were reported to the committee.

7 . CONCLUSIONS & RECOMMENDATIONS

After a detailed study of the data, and the oral and written statements and site visits, the Committee has arrived at the following conclusions.

1. The cashew plantations of PCK Ltd. in Kasaragod District are all located in the undulating hilly areas (Refer Plan - Annexure 21). The plantations are spread in isolated patches and are intertwined with habitations. The topography of the area precludes the possibility of aerial spraying observing all the protocols.

2. There are a large number of wells inside and just outside the plantations area. Several streams originate there. The water from the plantations (situated on the hills) can run off into the valleys inhabited by local people. The rivulets Panathur and Karicheri, which are fed by streams originating from or passing through the area, are tributaries of Chandragiri river, which supplies drinking water to Kasaragod town and several Panchayaths. The surangams, from which the local people draw water, are cut deep into the hills forming the plantations. They are prone to contamination by chemicals applied in the estates. Therefore, the hydrology and morphology of the area are unsuited for aerial spraying.

3. The human settlement pattern of the area also makes the plantation area unsuitable for aerial spraying. The adjoining areas are thickly populated. There are large number of houses inside the plantations. There are pockets of human settlement surrounded on 3 sides by the plantations. There are large number of houses and wells inside and just outside the plantations. The local people allow their cattle to freely graze in the plantation area. There are several schools inside and just outside the plantation area.

Even the Pesticide Manufacturers and Formulators Association has agreed to the view that the area is not ideal for aerial spraying of pesticides.

4. The PCK has not been following the rules prescribed for aerial spraying. This has been reported by the District Collector, all the functionaries of the Panchayaths who deposed before the Committee, the experts and the great majority of general public. There was no effective supervision of spraying and no monitoring of the precautionary measures and the ill-effects.

5. The same pesticide endosulfan was used continuously from 1981 onwards, in spite of the recommendations of Research organisations to rotate the chemicals. The reason given by the PCK is that endosulfan is the most economical pesticide available in the market. Even the possibility of the bugs acquiring immunity to endosulfan due to long exposure has not been considered by the PCK.

6. As in the cases of most other pesticides, endosulfan can cause acute toxicity in animals and human beings due to over exposure. That is why strict protocol is prescribed for its use. Though chronic toxicity due to long term exposure has not been convincingly established, it can not be ruled out.

7. There are reports of health problems free three Panchayath adjacent to the plantations. There is no direct evidence to attribute these directly to endosulfan pollution, but there is no evidence to completely deny it. Other usual causes like pollution from automobiles and industries are absent here. The only activity that is not normal is the aerial spraying of endosulfan. The pesticide is applied without observing the safety rules. The same chemical is used for 2 decades. Hence at this point of time, *there is no evidence to implicate or exonerate endosulfan as the causative factor of the health problems. But, the proof of absence cannot be taken as the absence of proof. In all environmental pollution problems, the onus of responsibility to prove or disprove the cause-effect relationship should be that of the polluter and not of the general public who are the victims of pollution.* Since cashew is an important export item earning revenue to the State and a large number of workers are involved in it, publicity to the pollution from endosulfan spray can prove detrimental to the industry.

On the basis of the investigations and the above conclusions, the Committee recommends the following measures to be adopted.

1. Ban aerial spraying of pesticides in all the cashew plantations of PCK Ltd. in Kasaragod District.

2. Use of endosulfan in the PCK plantations of Kasaragod District should be frozen for 5 years.

3. In the cashew plantations in the Perla Division (which includes Enmakaje Panchayath), a total pesticide holiday should be observed for 5 years. This plantation should be left to the nature during these 5 years. Detailed studies on tea-mosquito bug menace and its relation to the crop productivity should be made during this period.

4. In the other plantations of PCK in Kasaragod district, need based ground spraying, (manual or power-operated) of pesticides other than endosulfan may be resorted to, in consultation with research organisations.

5. The pesticide management and plant protection of PCK should be scientifically organised.

6. Research efforts to evolve integrated pest management (IPM) should be augmented.

7. Breeding programme to develop cashew strains resistant to tea-mosquito bug should be undertaken.

8. Since the cause of the human health problem could not be deduced conclusively, a detailed investigation involving scientists from all related fields should be conducted to identify the risk factors for the high morbidity in the Padre village and other affected areas. A detailed health survey should be conducted in the Padre village and other areas from which cases of abnormal health problems are reported. The health survey should cover the plantation workers also.

9. Since most of the people who complain about health problems are from the poorer sections of the community, the Government should make arrangements to provide special medical care to these persons.

10. The Government should take all steps to implement these recommendations and dispel the fears regarding pesticide application.

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UNIT

11. The right to information on the use of pesticides should be respected. The Gram Panchayaths should be given all details, when requested. The apprehensions of the local people regarding the alleged pesticide problem should be cleared by awareness programmes conducted through PCK, Agricultural Department and Research Institutions. In every division of the PCK, a committee consisting of the following members should be constituted for monitoring the proper application of pesticide.

1. President / presidents of the concerned Gram Panchayath / Panchayaths
2. Agricultural Assistant.
3. A representative of the Health Department
4. The Regional Officer of PCK
5. A representatives of the workers of the concerned division of the PCK.

Dr. A. Achyuthan
(Chairman)

22-11-01

Sri. L. Sundaresan
(Convener)

Dr. K.P. Aravindan
(Member)

Dr. M. Abdul Salam
(Member)

22/11/01

Dr. Samuel Mathew
(Member)

22/11/01

Dated 22-11-2001

ACKNOWLEDGMENT

The Committee acknowledges the unstinted cooperation that has been received from the Government Departments, Research Organisations, the Kasaragod Dist. Panchayath, the Gram Panchayaths in the area, N.G.Os, experts and the general public in conducting the study and places on record its sincere thanks to all of them.

LIST OF ANNEXURES

1. Copy of press cutting "Handicapped Calves : Curse or Insecticide?" from Sudha, Kannada Weekly, dt. 30 Sep. 1979.

2. Copy of press cutting from Udayavani "Aerial Spray of Pesticide : Why this Negligence" Kannada daily, dt. 24 Nov. 1981.

3. Copy of press cutting from the "Evidence Weekly", Dec. 25, 1981.

4. Copy of "Correspondence for communication" from Dr. Mohankumar Y.S, published in Kerala Med. Journal. Feb. 1997.

5. Letter dt. Jan. 16, 2001 from Sri. Y. Aravindan to the Director of Agriculture.

6. Letter dt. 21 Jan. 2001 from the Secretary, Enmakaje Panchayath, Addressed to the Agr. Secretary, Govt. of Kerala.

7. Copy of letter dt. 07 Feb. 2001 from Director, Directorate of Cashew nut and Cocoa Development, Cochin addressed to the Director of Agriculture.

8. Copy of G.O. (Rt) No. 353/2001/AD dt. 23-02-2001.

9. Copy of letter No. F.P.A/(Aerial Spray - PCK) 2001 dated 8 March 2001, addressed to Directorate of Cocoa and Cashew Development.

10. Copy of letter No. F.P.A (Aerial Spray - PCK)/2001/08 March 2001, addressed to Directorate of all Cashew Research Stations.

11. Copy of G.O. (Rt) No. 1322/2001/AD/25-08-2001.

12. Copy of Proceedings of the Dist. Collector, Kasaragod, dt. 17-02-2001.

13. Copy of letter No. F.P.A. (Tech. Adv.) 97 dt. 26-12-2977 from Director, NRCC to PCK

14. Copy of notice issued by PCK.

15. List of organisations and others who deposed before the Committee.

16. Copy of letter dt. 11-09-2001 from Director, Centre for Science and Environment, New Delhi.

17. Copy of letter dt. 11-10-2001 from Director, NIOH, Ahmedabad.

18. Bhaskara Rao EVD. "First Convict the Suspect and later conduct the Trial".

19. KAU Report I on the visit of the Expert Team. Table showing residues of endosulfan in samples collected from Padre. Feb. 2001.

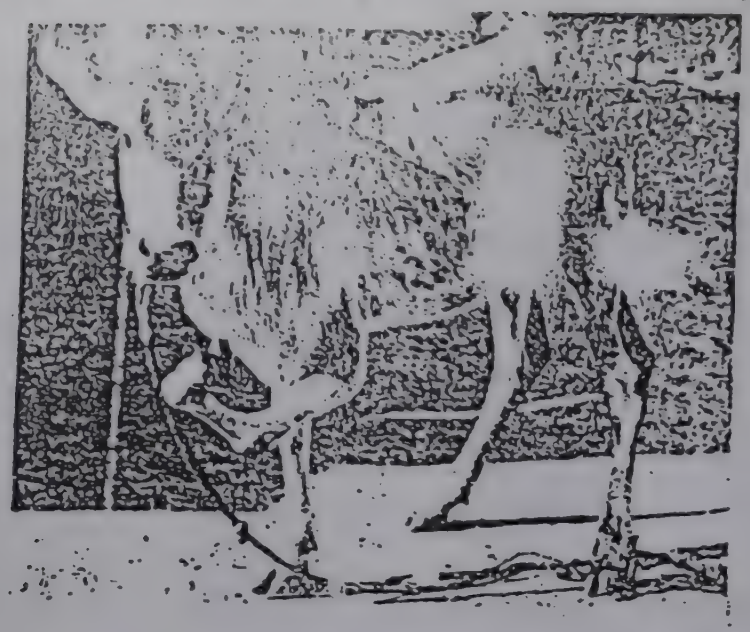
20. Copy of letter G4 - 4611/01 dt. 05-09-2001 from the Dist. Collector.

21. Extract from KSSP Survey Report.

22. Comments on SEC report by the Project Co-ordinator, AICRP in Pesticide Residue, IARI, New Delhi dt. 6.11.2001.

ANNEXURE 01

Sudha, ಅಕ್ಟೋಬರ್ 1979



ಅಂಗವಿಕಲ ಕರುಗಳು: ಕೀಟನಾಶಕದ ಶಾಪ?
(Handicapped Calves: Curse or Insecticide)

ಕೀಟಗಳನ್ನು ಕೊಂದುಹಾಕಲು ಮಾನವ ಕೋಡುವ ಉಪ್ಪಾಡ ಅವನ ಮೇಲೆಯೇ ತಿರುಗಬೀಳುತ್ತಿರುವುದಕ್ಕೆ ಕೆಲವು ಪ್ರತ್ಯಕ್ಷ ಉದಾಹರಣೆಗಳು

ಕೀಟನಾಶಕಗಳು ಆಧುನಿಕ ವಿಜ್ಞಾನ 'ಪುರುಷ ಕ್ರಾಂತಿ'ಗೆ ಇತ್ತ ಕೊಡುಗೆ. ಕೃಷಿ ಉತ್ಪಾದನೆಯ ಹೆಚ್ಚಳ ಮಾಡಿ ಇನ್ನಿತರ ಉದ್ದೇಶಗಳಿಗಾಗಿ ಕೀಟನಾಶಕಗಳ ಬಳಕೆಯ ವಿಧಾನ ನಮ್ಮಲ್ಲಿ ಬೇರು ಬಿಡುವ ಮುನ್ನವೇ ಅದರ ದುಷ್ಪರಿಣಾಮಗಳು ಕಾಣಿಸಿಕೊಂಡವು. ಇವುಗಳ ಉಪಯೋಗ ಕೃಷಿಗೆ ಸೀಮಿತವಾಗಿ ಉಳಿಯದೆ ಮನೆಗಳಲ್ಲಿ ದುಷ್ಪರಿಣಾಮಗಳ ಅರಿವಾ ಆಗಬೇಕಿದೆ. ನಾವಾಡ ಈ ಮುಖವನ್ನು ಸೂಕ್ಷ್ಮವಾಗಿ ಅವಲೋಕಿಸಿದರೆ ಆಶ್ಚರ್ಯ ಮತ್ತು ಆಲೋಚನೆಗಳು ಈ ದುಷ್ಪರಿಣಾಮಗಳಿಗೆ ಮೂಲಕಾರಣ ಎಂಬುದು ಮನವರಿಕೆಯಾಗಿರಬಹುದು.

ಇತ್ತೀಚಿನ ವರ್ಷಗಳಲ್ಲಿ ವಿಜ್ಞಾನಿಗಳನ್ನು 'ವಿಚಿತ್ರ'ವಾಗಿ ಕಾಡುತ್ತಿರುವ ಬೆಳವಣಿಗೆ 'ಮೂಕ ಗೋವು ಕಾಯಿಲೆ' ಇಂತಹ ಒಂದು ಘೋರ ಸಿದ್ಧಾಂತ. ಬೀಗಿದ್ದೂ ಹಾಗೂ ತಪ್ಪುಗಳಿಂದ ಪಾಠ ಕಲಿತು ತಿದ್ದಿಕೊಳ್ಳದೆ ಇರುವುದು ಬಹುಶಃ ಕೊಂಚ ನಿಜವು.

ವಿಚಿತ್ರ ಅಂಗವೈಕಲ್ಯ:

ಈಗ ಎರಡು ಕ್ಯಾಲೆಂಡರ್ ವರ್ಷಗಳಲ್ಲಿ ಮೊದಲ ಪದವಿ. ಒಂದು ನವೀನ ಅವಧಿಯಲ್ಲಿ ಕೆಲವು ಕಾಸರಗೋಡು ತಾಲೂಕಿನ ಎಣ್ಮಕಜೆ ಗ್ರಾಮ ವಲ್ಲಿ ನಾಲ್ಕು ದನಗಳು ಅಂಗವಿಕಲ ಕರುಗಳಿಗೆ ಜನ್ಮವಿತ್ತವು. ಒಂದು ಕರು ಹುಟ್ಟಿ ಸ್ವಲ್ಪ ಸಮಯ ದೊಳಗೇ ಸತ್ತುಹೋಯಿತು. ಇನ್ನೆರಡು ಹೇಗೋ ಆರೆಂಟು ತಿಂಗಳ ಕಾಲ ಬದುಕಿ ಉಳಿದುವು.

ಆದೊಂದು ಆರೆಂಟು ತಿಂಗಳ ಸ್ಥಳೀಯ ತಂಪು ಸುದ್ದಿ ಹೊತ್ತಾ ಕರು. ಹುಟ್ಟಿದಲ್ಲಿ ಅದನ್ನು ನೋಡಿದಾಗ ಯಾರವುಗಳ ಹಾ! ಗಟ್ಟಿಮುಟ್ಟಾಗಿಯೇ ಇದ್ದಂತೆ ಕಾಣುತ್ತಿತ್ತು. ಆದರೆ ಅದು ಮಲಗಿದ್ದಲ್ಲಿಂದ ಎದ್ದು ನಡೆಯಲು ಪ್ರಯತ್ನಿಸಿದಾಗ ತೊಡಕಾಗಿ ನಿಜಸ್ಥಿತಿಯ ಅರಿವಾಯಿತು. ಅದರ ಎರಡು ಮುಂಗಾಲು ಗೊತ್ತಾಗಿ 'ಗ' ಆಕಾರದಲ್ಲಿ ಮೇಲಕ್ಕೆ ಬಗ್ಗಿತ್ತು. ಜನ್ಮತಃ ಬಂದ ಈ ಅಂಗವೈಕಲ್ಯವಿದ್ದಾಗಿ ಕರು ನಡೆಯಲು ಪಡುವ ಪಾಡು ಎಷ್ಟಿತ್ತೆಂದರೆ ಕರುಣಾಜನಕ. ಕೊನೆಗೆ ಮನುಷ್ಯ ಪ್ರೇಮವನ್ನು ಮೆರೆಯುತ್ತಾ ಮೆಷಿನ್‌ಗಳ ಭುಜದೇ ಅದನ್ನು ಎತ್ತಿಕೊಂಡು ಹೊರಕರೆಯಬೇಕಾಯಿತು. ಮೊದಲೇ ಬೈಗು. ಕೆಸರಿನ ಈ ಅರಿವಿನ ಕಾಯಿಲೆಯನ್ನು ಆರೆಂಟು ತಿಂಗಳ ಹಿಂದೆ ಪುಟ್ಟದೊಡನೆಯೇ ಸತ್ತ ಇನ್ನೊಂದು ಅಂಗವಿಲ ಕರುವಿನ ಕಾಯಿಲೆಯನ್ನು ಅಮು ಹೋಲಿಸಿದರು. ಈ ಎರಡು ದನಗಳೂ ಹಿಂದೆ ಮೂರು ನಾಲ್ಕು ಬಾರಿ ಆರೋಗ್ಯವಂತ ಕರುಗಳಿಗೆ ಜನ್ಮವಿತ್ತುದನ್ನೂ ಆ ಕರುಗಳು ಇಂದಿಗೂ ಚೆನ್ನಾಗಿ ಬೆಳೆದು ಸಂತಿರುವುದನ್ನೂ ಸ್ಮರಿಸಿಕೊಂಡರು.

ಅಲಕ್ಷ್ಯ:

ನಾಲ್ಕೂ ಹುಟ್ಟಾ ಅಂಗವಿಕಲ ಕರುಗಳ ಪೈಕಿ ಮೂರು ಬಾಲ ಮರಣ ಹೊಂದಿದುವು. ಊನ ಅಂಗದ ಸಮೇತವಾಗದ ಕರುಗಳಿಗೆ ಜನ್ಮವಿತ್ತ ಎಲ್ಲಾ ದನಗಳೂ ಸ್ಥಳೀಯ ತಳಿಯವು. ದಿನಾಪತ್ತೆ ಮೇವಿಗೆಂದು ಗುಡ್ಡಕ್ಕೆ ಹೋಗಿ ಸಂಜೆ ಹಿಂತಿರುಗುತ್ತಿದ್ದುವು. ಈ ಸಹಜ್ಜನಲ್ಲಿ ಕೇರಳ ರಾಜ್ಯ ಗೇರು ಅಭಿವೃದ್ಧಿ ನಿಗಮದ ಅಧೀನದಲ್ಲಿರುವ ಗೇರು ತೋಟ ಇದೆ. ಮೇವಿನಾಗಿ ತೋಟದ ಬದಿಯ ಗಡಿ ಪ್ರದೇಶವನ್ನೇ ಇವುಗಳು ದನಗಳು ಆಶ್ರಯಿಸಬೇಕಾಗಿದೆ.

ಕೇರಳದಲ್ಲಿ ಗೇರುಮರ ಹೂಬಿಡುವ ಸಮಯದಲ್ಲಿ ಹೂಗಳನ್ನು ಜೀ ಸೊಳ್ಳೆಗಳಿಂದ ರಕ್ಷಿಸಲು ಕಳೆದೆಮ ವರ್ಷ (1977–78 ಸೆಪ್ಟೆಂಬರ್ – ಡಿಸೆಂಬರ್) ಎಂಡೋಸಲ್ಫಾನ್ ಕೀಟನಾಶಕವನ್ನು ಪೆರಿಣಾವ್ಹರ್ ಮೂಲಕ ಸಿಂಪಡಿಸಲಾಗಿತ್ತು. ವರ್ಷ ಕೈರಮು ಬಾರಿಯಂತೆ ಒಟ್ಟು ನಾಲ್ಕು ಬಾರಿ ಈ ಸಿಂಪರಣಾಕಾರ್ಯ ನಡೆದಿತ್ತು. ಇದೇ ರೀತಿಯ ಸಿಂಪರಣೆಗಳು ಕರ್ನಾಟಕ, ಗೋವಾ ಮತ್ತು ತಮಿಳ್ನಾಡುಗಳಲ್ಲೂ ನಡೆದಿವೆ.

ಗರ್ಭ ಹೊಂದಿದ್ದ ದನಗಳು ಮೇವಿಗೆ ಹೋಗಿ ಬರುವಾಗ, ಕೆರೆಯಲ್ಲಿ ಕುಡಿಯುವ ನೀರಿನ ಅಥವಾ ತಿನ್ನುವ ಹುಲ್ಲು, ಸೊಪ್ಪುಗಳ ಮೂಲಕ ಕೀಟನಾಶಕ ಅವುಗಳ ದೇಹವನ್ನು ಪ್ರವೇಶಿಸಬಹುದು. ಅದು ಗರ್ಭದಲ್ಲಿನ ಕೋಶಕಗಳ ಮೇಲೆ ವಿಷಾಮಯ ಪರಿಣಾಮ ಬೀರಿ ಕರುಗಳ ಈ ಹುಟ್ಟುಸೊಂಪಿಗೆ ಬಂದ ಸ್ಥೂನತೆ ಹಾಗೂ ತಕ್ಷಣಕ್ಕೆ ಅಥವಾ ಮರಣಕ್ಕೂ ಇದೇ ಕಾರಣವಾಗಿರಬಹುದೆ? ಕೀಟನಾಶಕ ಸಿಂಪರಣೆಯ ಸುಮಾರಿನ ಅಲಕ್ಷ್ಯದ ಒಕ್ಕಣೆಯಲ್ಲಿ ಇಂತಹ ದೋಚಣೆ ಸಹಜವೇ ಆಗಿತ್ತು.

ಅಪಾಯ ಸ್ಥೂನತೆ

ಈ ಮೇಲೆ ದಕ್ಷಿಣಕನ್ನಡದಲ್ಲಿ ಪಾಸಿ ವೃತ್ತಿ ನಡೆಸುತ್ತಿರುವ ಪ್ರಾಣಿ ವೈದ್ಯರೊಬ್ಬರು ಈ ಬೆಸಿಗೆ ಬದಿಗಿದ ವಿದ್ಯಮಾನಗಳನ್ನು ವಿಶ್ಲೇಷಿಸಿ "ಕೀಟನಾಶಕಗಳ ಪರಿಣಾಮವಾಗಿ ಈ ರೀತಿ ಹುಟ್ಟುಸೊಂಪಿನೇ ಸ್ಥೂನತೆಗಳು ಬರುವ ಸಾಧ್ಯತೆ ಇದೆ" ಎಂದು ಅಭಿಪ್ರಾಯಪಟ್ಟಿದ್ದರು.

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ನವದೆಹಲಿಯಲ್ಲಿರುವ ವಿಜ್ಞಾನಿಯಾಗಿರುವ ಶ್ರೀ ದಿನೇಶ್ ಬಿಸ್ವಾಸ್ ಅವರು ಲೇಖನ ವೊಂದರಲ್ಲಿ ಕೀಟನಾಶಕಗಳ ದುಷ್ಪರಿಣಾಮ ಗಳನ್ನು ವಿವರಿಸುತ್ತಾ "ಕೀಟನಾಶಕಗಳ ವೈಕಿ ಡಿ. ಡಿ. ಟಿ. ಬಿ. ಎಚ್. ಸಿ. ಯಂತಹ (ಎಂಡೋಸಲ್ಫಾನ್ ಕೂಡಾ ಇದೇ ವರ್ಗದ್ದು) ಆರ್ಗನೋ ಕ್ಲೋರಿನ್ ಸಂಯುಕ್ತಗಳು, ವಾತಾವರಣದಲ್ಲಿ ಮನುಷ್ಯ ಮೀನುಗಳು, ಪಕ್ಷಿ, ಪ್ರಾಣಿಗಳು ಹಾಗೂ ಮನುಷ್ಯರ ಆಹಾರ ಚಕ್ರದ ಮೂಲಕ ಅವರ ಅಂಗಾಂಶಗಳಲ್ಲಿ ಸಂಗ್ರಹವಾಗುವ ವ್ಯವಸ್ಥಿತಿಯವು. ಪಕ್ಷಿಗಳ ಪಿತ್ತಕೋಶದಲ್ಲಿ ಸಂಗ್ರಹವಾದ ಡಿ.ಡಿ.ಟಿ. ಅವುಗಳ ಸಂತಾನೋತ್ಪತ್ತಿ ಸಾಮರ್ಥ್ಯ ಮತ್ತು ಪ್ರತ್ಯುತ್ಪಾದನಾ ಶಕ್ತಿಯನ್ನು ಕುಂಠಿತಗೊಳಿಸುವ ಉದಾಹರಣೆಗಳಿವೆ. ಧಕ್ಕ ವಂಚಲನೆ, ಎನ್‌ವ್ಯಾಮ್ ಮತ್ತು ಪಾರ್ಥೇನಿಯಂಗಳ ವ್ಯವಸ್ಥೆಯನ್ನು ಹಾಗೆಯೇ ಇರುವುದೂ ಗೊತ್ತಾಗಿದೆ. ಕೆಲವೊಂದು ಆರ್ಗನೋ ಕ್ಲೋರಿನ್ ಕೀಟನಾಶಕಗಳು ಕ್ಯಾನ್ಸರ್ ಉಂಟು ಮಾಡುತ್ತವೆ ಎಂದು ಸಂಶಯಿಸಲ್ಪಟ್ಟಿವೆ" ಎಂದು ಬರೆದಿದ್ದಾರೆ.

ಆರಂಭದಲ್ಲಿ ವ್ಯಸ್ತಾಪಿಸಿದ ಸಾಲ್ಮನ್ ಘಟನೆಗೆ ಸಂಬಂಧಿಸಿದ ಜಾನುವಾರು ಗಳು ಆದ್ದಾಡಿದ ವಾತಾವರಣ, ಅವುಗಳ ಆಹಾರಕ್ರಮ ಮಾಗೂ ಕೀಟನಾಶಕಗಳ ದುಷ್ಪರಿಣಾಮಗಳ ಬಗೆಗಿನ ವೈಜ್ಞಾನಿಕ ವರದಿಗಳನ್ನು ಗಮನಿಸಿದಾಗ ಈ ಕರುಳಿನ ಹುಣ್ಣು ನ್ಯೂನತೆಗೆ, ಅಕಾಲ ಮರಣಕ್ಕೆ ಕೀಟನಾಶಕಗಳು ಕಾರಣವಾಗಿರಬಹುದೇ ಎಂಬ ಸಂಶಯಕ್ಕೆ ಇನ್ನೂ ಹೆಚ್ಚಿನ ಅವಕಾಶ ವಾಗುತ್ತದೆ.

ಅಧ್ಯಯನ ನಡೆಯಲಿ

ಇನ್ನು ಮುಂದಾದರೂ ಇಂತಹ ಸಂದರ್ಭಗಳಿಗೆ ಕೈಹಾಕುವ ಮೊದಲು ಸರಕಾರ ಮತ್ತು ಇಲಾಖೆ ಎಚ್ಚೆತ್ತು ಮೂಲವ್ಯಾಧಿಗಳ ಈ ಭೀಕರ ಸ್ಥಿತಿಯಲ್ಲಿ ಕೀಟನಾಶಕ ಗಳ ಪಾತ್ರವೆಷ್ಟು ಎಂಬುದನ್ನು ವಿವೇಚನೆ ಮಾಡಿಕೊಳ್ಳಬೇಕು. ಈ ದಿಸೆಯಲ್ಲಿ ವಿಜ್ಞಾನಿಗಳ ವಲಯದಿಂದ ಅಧ್ಯಯನ ಆಗಬೇಕು.

ಒಂದು ವೇಳೆ ಕೀಟನಾಶಕ ನಿಷೇಧ ಯಲ್ಲದೆ ಬೇರೆ ವಿಧಿಯಿಲ್ಲ ಎಂದಾದರೆ, ಸಾಕಷ್ಟು ಕಟ್ಟುನಿಟ್ಟಿನ ಮುಂಜಾಗ್ರತಾ ಕ್ರಮಗಳು ಜಾರಿಗೆ ಬರಲಿ. ಕೀಟನಾಶಕ ನಿಷೇಧಕ್ಕಾಗಿ ಹೆಕ್ಟಾರ್ ಒಂದಕ್ಕೆ 400 ರೂಪಾಯಿಗಳಂತೆ ಲಕ್ಷಗಟ್ಟಲೆ ರೂಪಾಯಿ ವೆಚ್ಚ ಮಾಡುವ ಇಲಾಖೆ ಎಷ್ಟಾರು ಸಾವಿರ ರೂಪಾಯಿಗಳನ್ನು ಸಾರ್ವಜನಿಕ ವೆಚ್ಚವನ್ನಾದರೂ ಹಿಂದೆಗೆಯಬಾರದು. ಸ್ಥಳೀಯ ವಿಜ್ಞಾನಿಗಳು, ಧನಿ ವರ್ಧಕಗಳು, ಕಾರ್ಯಕರ್ತರು ಹಾಗೂ ಸ್ವಯಂ ಸೇವಕರ ಮೂಲಕ ಸಮಾಜದ ಎಲ್ಲಾ ಹಂತಗಳ ಜನರಿಗೆ ಕೀಟನಾಶಕಗಳ ಬಳಕೆ ಬಗ್ಗೆ ಜ್ಞಾನ ಹೆಚ್ಚುವಂತೆ ಮಾಡುವುದು ಇಲಾಖೆಯ ಸಹಕಾರದ ಅದ್ಯಕರ್ತವ್ಯ.

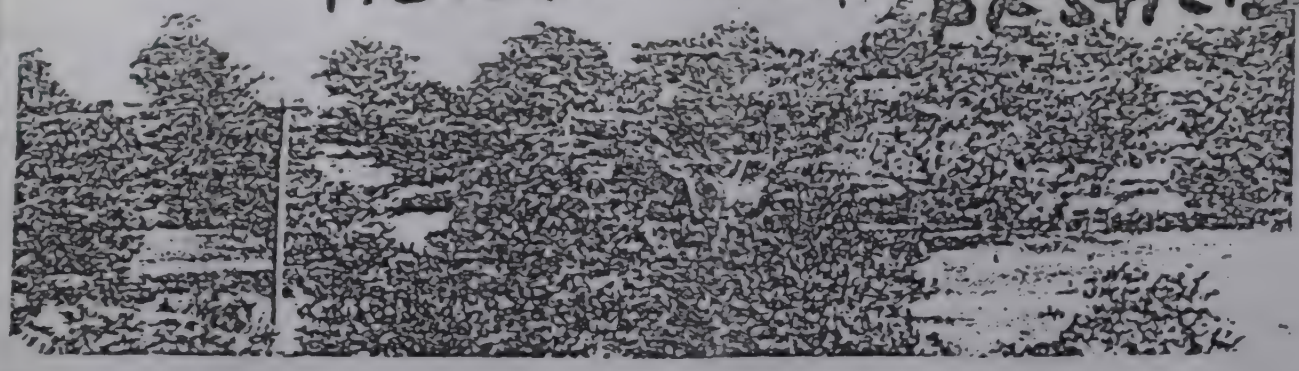
ಈ ಲೇಖನದಲ್ಲಿ ವಿವರಿಸಿರುವುದು ಕೀಟ ನಾಶಕಗಳ ದುಷ್ಪರಿಣಾಮದ ಒಂದು ಸಂಶಯಿತ ಮುಖ ಮಾತ್ರ. ಒಂದೆರಡು ಸೂಚನೆಯಷ್ಟೆ. ಇನ್ನೂ ಅರಿವಿಗೆ ಬೆಳಕಿಗೆ ಬಾರದ ತೊಂದರೆಗಳು ಅದೆಷ್ಟೋ!

-"ಶ್ರೀ ಪಥ್ರೆ"

24·11·81

ANNEXURE 02

AERIAL SPAYING OF PESTICIDES



ಕೀಟನಾಶಕದ ವೈಮಾನಿಕ ಸಿಂಪರಣೆ: ಭಿಕ್ಷು ಅಲಕ ?

Aerial Spraying of Pesticides

ಪರ್ಲ, ನ. 23: ಕಾಸರಗೋಡು ತಾಲೂಕಿನ ಗೇರು ತೋಟಗಳಿಗೆ "ಥಿಯೋಲ್ ಸ್ಪೆಶ್" ನಸೆಸುವಾಗ ಪಲಿಕಾಪ್ಟರಿನಿಂದ ಹೊಮ್ಮಿಕ್ಕುವ ಪುಲಿ ಕೀಟನಾಶಕ ಎಂಡೋಸಲ್ಫಾನಿನ ಜೊತೆಗೆ ಎಂದಿನಂತೆ ಕೇರಳ ಪ್ಲಾಂಟೇಶನ್ ಕಾರ್ಪೊರೇಶನ್ ಈ ಬಾರಿಯೂ ವೈಮಾನಿಕ ಕೀಟನಾಶ ಸಿಂಪರಣೆಗೆ ಅಗತ್ಯ ವಿರುವ ಎಲ್ಲಾ ಮುಂಜಾಗ್ರತಾ ಕ್ರಮಗಳನ್ನೂ ಗಾಳಿಗೆ ತೂರಿ ಬಿಟ್ಟಿದೆ.

"ನವೆಂಬರ್-ಡಿಸೆಂಬರ್ ಎಂಬೀ ತಿಂಗಳುಗಳಲ್ಲಿ ಸಿಂಪರಣೆ ನಡೆಯಲಿದೆ." ಗಮ ಕೆಲ ಪೆಂಮ ಕೆಲೀರಿಗಳ ಮೂಲೆಯಲ್ಲಿ ನೋಟೀಸು ತಟ್ಟಿ "ಸಾರ್ವಜನಿಕರಿಗೆ ಸಾಕಷ್ಟು ಮುಂಚಿತ ವಾಗಿಯೇ ಸಿಂಪರಣೆಯ ಬಗ್ಗೆ ತಿಳಿಸಿ" ಗಾಬೆ ಕೈತೊಳೆದುಕೊಳ್ಳುವ ಮೊದಲು. ಎರಡು-ಮೂರು ದಿನಗಳ ಸಿಂಪರಣೆಗಾಗಿ ಗಲ್ಲಿನ ಜನ ಎರಡು ತಿಂಗಳ ದೀರ್ಘಕಾಲ ಬಿಸಿಲು ಬಿಗಿ ಬಿಡಿದು ಕುಳಿತಿರಬೇಕೇ? ನಿಗದಿತ ದಿನಗಳನ್ನಷ್ಟೆ ಖಚಿತವಾಗಿ ತಿಳಿಸಿದರೆ ದೀರ್ಘಕಾಲ ಎಚ್ಚರಿಕೆ-ಕಾತರಗಳಿಂದ ಕಾಯುವ ಕೆಲಸ ಪ್ರೌಢಾವಸ್ಥೆಯ ವಯಸ್ಕರ ಮಾನಸಿಕ ತಳಮಳ ತಪ್ಪಬಹುದು. ಗಲ್ಲಿ ಪ್ರಸಾರವಾಗುವ ದಿನ ಪತ್ರಿಕೆಗಳು ಹಾಗೂ ಇನ್ನಿತರ ಮಾಧ್ಯಮಗಳ ಮೂಲಕ ಸಿಂಪರಣೆಯ ಸುದ್ದಿಯನ್ನು ಮೊದಲೇ ಪ್ರಚಾರಪಡಿಸುವ ವ್ಯಾಮೋಹಕ್ಕೆ ಯತ್ನವನ್ನೇಕೆ ಕಾರ್ಪೊರೇಶನ್ ಮಾಡಬಾರದು?

"ಮದ್ದಿನ ಶಕ್ತಿ ಕುಂದುವವರೆಗೆ ಮದ್ದು ಬಿಟ್ಟು ಸ್ವಳದಲ್ಲಿ ಜಾನುವಾರುಗಳು ಹುಲ್ಲು ತಿನ್ನದಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. ಮದ್ದು ಬಿಡುವ ಸಮಯದಲ್ಲಿ ಅಜಾಗರೂಕತೆಯಿಂದ ಹೋಗುವುದು. ಆ ಪ್ರದೇಶದಲ್ಲಿ ಆಹಾರ ಸೇವಿಸುವುದು. ಆಹಾರ ವಸ್ತುಗಳನ್ನು ಮನುಷ್ಯರಿಗೆ ಅಥವಾ ಮೃಗಗಳಿಗಾಗಿ ಸಂಗ್ರಹಿಸುವುದು-ಗತ್ಯಾದಿ ಮೂವತ್ತಾರಲು" ಎಂದು ಎಚ್ಚರಿಕೆ ನೀಡುತ್ತದೆ ನಿಗಮದ ನೋಟೀಸು. ಕೀಟನಾಶಕದ ಶಕ್ತಿ ಕುಂದಲು ಎಷ್ಟು ದಿನ ಗಳಿವೆ? ಅಪಾಯದ ಸಂದರ್ಭಗಳಲ್ಲಿ ನೀಡಬೇಕಾದ ವಿಷಪಾರಿ ಯಾವುದು ಎಂಬ ಮಾಹಿತಿಗಳನ್ನೂ ತಿಳಿಸುವುದು ನಿಗಮದ ಕರ್ತವ್ಯವಲ್ಲವೇ?

ಗೇರು ತೋಟದ ಒಳಗೆ ಹಾಗೂ ಸುತ್ತಲೂ ಇರುವ ನಿವಾಸಿಗಳ ಕುಟಿಯುವ ನೀರಿನ ಮೂಲಗಳಿಗೆ ಸಿಂಪರಣೆಯ ಸಮಯದಲ್ಲಿ ನಿಗಮ ತನ್ನ ವೆಚ್ಚದಲ್ಲಿ ಮುಚ್ಚಿಗೆ ಏರ್ಪಡಿಸಬೇಕು; ಸಾರ್ವಜನಿಕರ ಆರೋಗ್ಯಕ್ಕೆ ತೊಂದರೆಯಾಗದಂತೆ ಎಲ್ಲಾ ಮುನ್ನೆಚ್ಚರ ವಹಿಸಬೇಕು ಎನ್ನುತ್ತದೆ ನಿಯಮ. ಇವನ್ನು "ಕಾಗದದ ನಿಯಮ"ಗಳೆಂದು ಹಗುರವಾಗಿ ತೆಗೆದುಕೊಳ್ಳುವ ನಿಗಮದ ಧೋರಣೆ ತಕ್ಷಣವಿಂದ ಬದಲಾಗಬೇಕು – ಸಾರ್ವಜನಿಕರ ಹಿತದೃಷ್ಟಿಯಿಂದ.

ಚಿತ್ರ-ವರದಿ: "ಪ್ರೀ" ಪರ್ಲ

UDAYAVANI 24-11-81

57

Dec 25-31, 1981

ANNEXURE 03

EVIDENCE WEEKLY public health

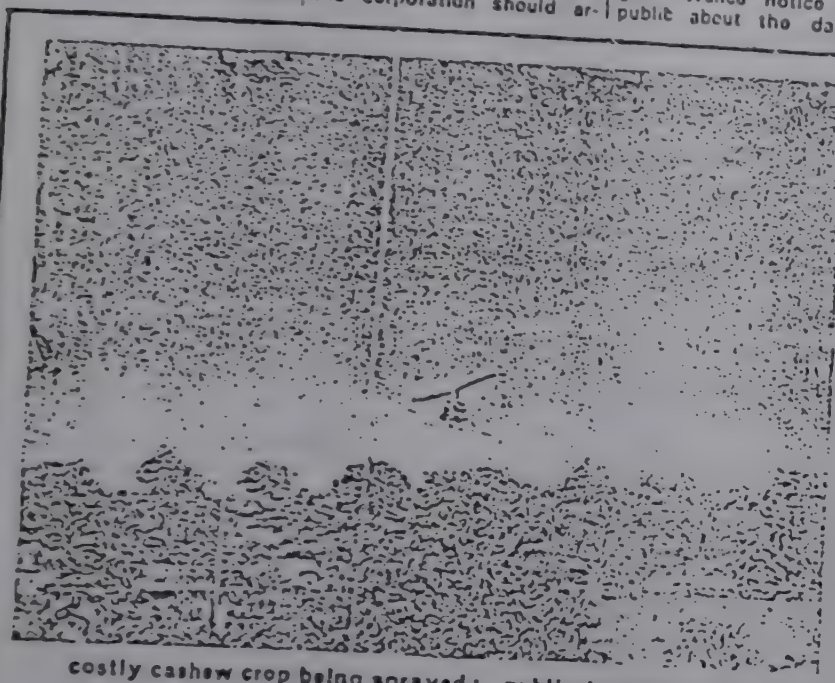
aerial spray of pesticides makes

life cheaper than cashew

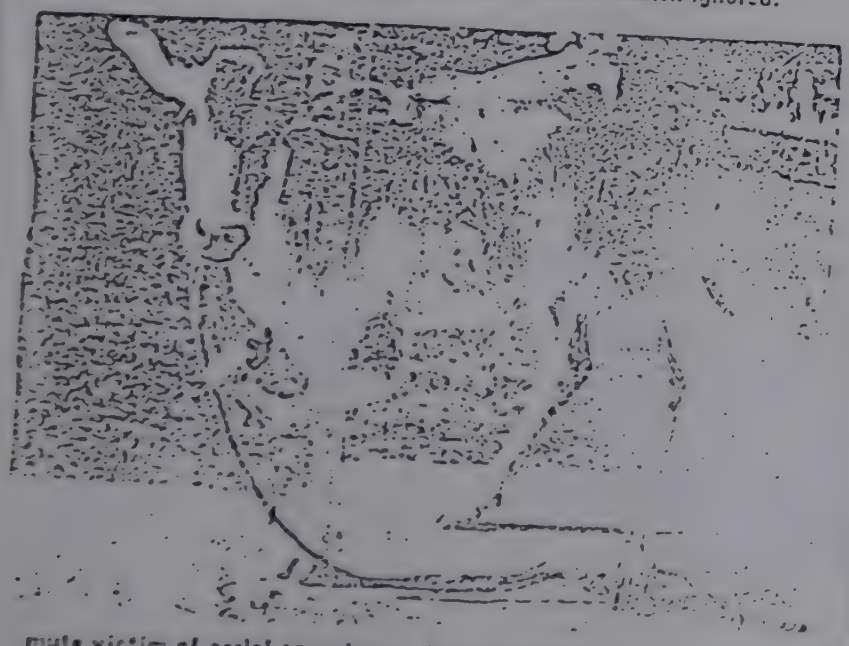
ANNEXURE 03

Since a few years, the plantation corporation of kerala, which conducts aerial spray of pesticides on its cashew gardens, is reported to have considerable havoc to the cashew inflorescence.

rules laid down for aerial spraying clearly indicate that the corporation should ar-



costly cashew crop being sprayed : public health ignored.



mute victim of aerial spraying : there may be human victims too.

the corporation giving any regard to those precautions, it does not even bother to give advance notice to the public about the dates of couple of days in an panchayat area. why can't the concerned authorities notify the specific dates of spray instead of keeping the public in tension and suspense for 60 long days? instead of putting up a show of 'advance notice', it would be in the interest of people if the corporation makes use of all the available media to convey the exact dates of spraying and takes proper care during this period to protect the common man.

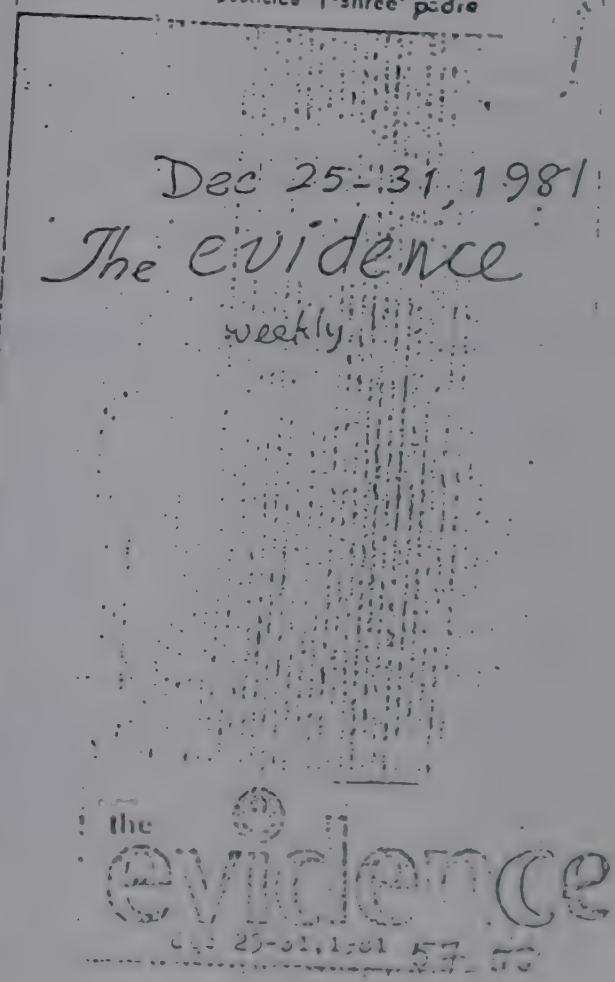
while the corporation notice goes on to warn that "untill the power of the pesticide diminishes, people should neither collect food from the area nor walk there 'carelessly' or allow their cattle for grazing," on the other hand, it doesn't mention the number of days during which the power of the pesticide remains in the area or the name of the antidote to be administered in case of danger! are the people expected to stay indoors, keep their cattle tied up and stop collecting food for two full months plus the period during which the "power of the pesticide" continues?

many cases of drinking water pollution are reported from different parts of kasaragod taluk. incidents of people walking in the area — unaware of the spray — developing swooning effects are many. "leave alone the plight of passers-by, we people who reside amidst the cashew gardens have to suffer day long irritation in chest and giddiness", prominent citizen of the locality complained when talking to 'the evidence'.

in 1977-78, four cases of cows giving birth to calves with deformed fore-limbs were reported, within a gap of six months after the spray, from enmakaje village in kasaragod taluk. although three of them died soon, the fourth one was alive for a long time. these cases were suspected to be the ill-effects of the carelessly sprayed pesticide.

cashew may be an important cash crop, but public health and preventation of cruelty to animals are equally important, and the plantation corporation has no right to endanger villagers' health and rural economy in order to supply cashew to rich foreigners, just because the poor kerala villagor cannot complain.

report and photographs by :
'shree' padre



the evidence
dec 25-31,1981 57

ANNEXURE 04

KMJ 3/1997

Correspondence

KMJ FEB 97

Sir,

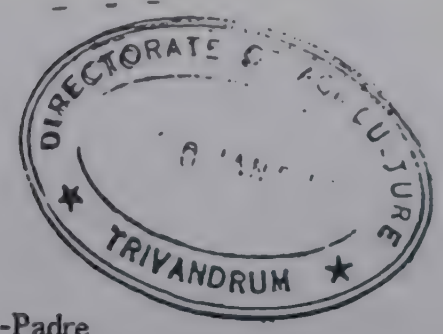
There is a village called PADRE in Enmakaje Panchayat of Kasaragod District. I have been practising nearby for the last 14 years. It is interesting to note that there are many many cases related to CNS - mainly epilepsy and mental retardation and some psychosis. It is curious because most of the patients live beside a small river flowing through the village. If a detailed census is taken I think there will be more than 100 cases. People attribute this to some ill-effect of a 'Theyyam' called 'Jatadhari'.

I feel the root of the problem lies in the water itself which might contain a mineral or radioactive substance which is harmful to the brain.

It will be a very interesting topic for research students. I hope someone will come forward and in turn the society will be benefited.

Dr. Moban Kumar Y. S.
Vani Nagar, Kasargod

ANNEXURE 05



16th January 2001

From : 04459

Aravinda .Y .,
Chairman ,
Endosulfan Spray Protest Action Committee -Padre ,
Yedamale ,
Post : Padre ,Via Perla 671552
Kasaragod

To :

Director of Agriculture
Govt of Kerala
Vikas Bhavan
Thiruvanamthapuram

Dear Sir ,

Sub : **Aerial spray of Endosulfan-suspected to have caused hundreds of killer diseases in and around Padre Village - Immediate stopping of the spray and remedial measures - requested .**

There is a shockingly high incidence of incurable diseases like **Cancer , Mental Retardation , Psychiatry , Epilepsy, Congenital anomaly , Suicide, Asthma , Acute skin diseases** like Psoriases , **High abortion** rate in humans & animals etc in 6th and 7 wards (in Padre Village) of our Enmakaje Panchayath and around . No community , class , sex , age is barred from the attack of these killer diseases . In the last one decade , there were about 46 cancer deaths . Only a detailed , house-to-house survey will bring the real data , which would be far more than the above number .

I am providing below the data furnished by Dr.YS Mohan Kumar, MBBS, who has been practicing in this area since nearly 2 decades :

Number of cases as recorded by Dr.YS Mohankumar,MBBS. as on 5.1.2001

Cancer - living	3
Cancer - dead	46
Mentally Retarded	23
Psychiatric Cases	43
Epilepsy	23

9

18

156

(This in about 4 sq.km area of Padre village , Enmakaje Panchayath,Kasaragod Dt,Kerala,India, from among an estimated population of 2,000 people, from approximately 400 houses.)

You are aware that Plantation Corporation of Kerala has been aerially spraying Endosulfan in this locality since the last 30 years . Even though exact causes of very high incidence for the dreaded diseases in our village is yet to be medically studied and established, available toxicological studies indicate a finger to endosulfan .

I am just quoting one such source here :

" Endosulphan has a proven toxic effect on the human foetus (and on mammalian fetus) and produces mutations. Organochlorines in general have the whole range of possible toxic effects on liver, kidney, bonemarrow, blood, brain (loss of intellectual functions and psychiatric illness), carcinogenicity, damage to reproductive system and to foetus/embryo. Organochlorides differ in their most prominent of toxic effects, in the amount needed to trigger short-term poisoning symptoms and long-term poisoning, and the most easy route of ingestion/absorption into the body." (Source :a German publication from 1988:Gefährdungen der Gesundheit durch Pestizide - to be translated as "Health dangers arising from pesticides" - by a team of authors:Irene Witte, Ruth Jähne, Rolf Weinert, Kilian Köbrich, Heike Jacobi)(Frankfurt, Germany, 88)

The shocking fact being the above , we, on behalf of our villagers urge you to use your good office to :

(1) Ban endosufan spray either aerially or from ground - with immediate effect .

Since the matter is very very serious , affecting hundreds of families and s bound o show up in many more in the years to come , we request you to take immediate steps on war footing . We , on our behalf will extend our fullest co-operation to your efforts in this regard .

We'll appreciate if you intimate the action taken by your goodself to us .

60

Enmakaje Grama Panchayat, Perla

Secretary
Enmakaje Grama Panchayat

P. O. PERLA - 671 552
Kasaragod Dist.
Phone : (0499) 895031 (O)

Ref :- A-22/2001

Date 21-1-2001

19th Jan 2001

ANNEXURE 06

AGRICULTURE DEPARTMENT, GOVERNMENT
27 JAN
THIRUVANANTHAPURAM

02740

DIRECTORATE OF AGRICULTURE
9 FEB 2001
TRIVANDRUM

To

Agricultural Secretary
Govt of Kerala
Secretariat Buildings
Thiruvananthapuram

Respected Sir,

Sub : **Aerial spray of Endosulfan-suspected to have caused hundreds of killer diseases in and around Padre Village - Immediate stopping of the spray and initiating remedial measures - requested .**

We understand that in and around Padre village of our Panchyath , there is a very high incidence of diseases like Cancer , Mental Retardation , Psychiatry , Epilepsy etc . According to a survey conducted by a local doctor , more than 156 people from an estimated population of 2000 (approx 400 houses), are afflicted with cancers and diseases of the central nervous system. Infertility, the numerous stillbirths, miscarriages, irregular menstrual cycles are all there, but not included in this survey.

Plantation Corporation of Kerala (PCK) has been spraying endosulfan and endrin here aerially since the last 3 decades . Toxicology studies of endosulfan in recent years have clearly pointed out possibility of all the above diseases due to the spraying of this organo-chlorine pesticide . Many concerned environmentalists who have visited the area has indicated a possible co-relation between the pesticide spray and the high incidence of diseases .

In view of this, our Panchayath , in its meeting dated 11th Jan 2001 has passed the following resolutions :

RESOLUTION No.185/2001 (1):

In view of the shockingly high rate of serious diseases like Cancer , Psychiatry , Epilepsy , Mental Depression , Born Handicapped , Asthma & Skin diseases that has come to light from Padre and other areas of our Panchayath , we , the members of Enmakaje Panchayath hereby unanimously resolve to vehemently oppose against any kind of endosulfan spray in our area - aerial or otherwise - until and unless a thorough multi-discipline medical survey and investigation of the cause for this tragedy is conducted by the concerned officials

61 60

Ann 06, page2

general and Padre in particular who have been suffering from serious illness like Cancer , Psychiatry , Epilepsy , Mental Depression , Born Handicapped , Asthma & Skin diseases . Further , we also urge that an immediate,multi-discipline survey and medical investigation consisting of experts from all the disciplines like Psychiatry , Neurology , Psychologist/Counselor , Toxicology , Gynecology (lady) , Nutrition and Family Physician to find out the cause for this very high incidence of diseases should be taken up immediately .

RESOLUTION No . 185/2001 (3) :

In view of the ill-effects of endosulfan reported in the press ,quoting experts in the field ,we, the members of Enmakaje Pachayath unanimously resolve to caution the Plantation Corporation of Kerala (PCK) and the institutions that have reportedly certified the said organo-chlorine pesticide as harmless that our Panchayath is opposed to any form of spray of the said pesticide and if PCK goes ahead with spraying of this pesticide despite our opposition, all the above concerned institutions would be responsible for any kind of harm that occurs to human beings , animals and agriculture crop of our Panchayath .

We , therefore , earnestly request your goodself to immediately use your good office to :

(1) Bring pressure on PCK & Kerala Govt to stop endosufan spray either aerially or from ground .
(2) Urge the concerned officials to conduct a thourough multi-discipline medical investigation of the diseases and a survey of all the abovementioned illnesses in Padre and neigbouring villages .
(3) Demand medical treatment to all the patients of above diseases in Padre and neighbouring villages on war footing .

Hope you'll do the needful at the earliest and protect the lives of our villagers from further damage .

Sincerely yours,

Secretay

SECRETARY
ENMAKAJE GRAMA PANCHAYAT

61.62

ANNEXURE 07

निदशक (कार्यालय) / Director (Office) : 373239
Res : 777155
कार्यालय Office : 351751
तार Grams : CASHEW
फाक्स Fax : 0484-373239

भारत सरकार
GOVERNMENT OF INDIA

काजू और कोको विकास निदेशालय
DIRECTORATE OF CASHEWNUT AND COCOA DEVELOPMENT

कृषि मंत्रालय Ministry of Agriculture
(कृषि एवं सहकारिता विभाग) (Department of Agriculture & Co-operation)
कोचिन - 682 016 (केरल) Cochin - 682 016 (Kerala)

प.सं. No
Enclosure sent
Follow up will be
To

CS 146'C02'00 01

दिनांक Date : 07 FEB 2001

08824

DIRECTORATE OF AGRICULTURE
8 FEB 2001
TRIVANDRUM

Director of Agriculture,
Government of Kerala,
Vikas Bhavan
Trivandrum-695 033.

Sub: Crop Adminsitration- aerial spraying with endosulfan- reg.

Sir,

I am to inform you that this Directorate is in receipt of a report on the incidence of certain killer diseases in and around the Padre village nearby the plantations of the Plantation Corperation of Kerala, Kasaragod district, Kerala State. suspected to have been caused due to the aerial spraying of the pesticide endosulfan. In this connection the Director. National Research Centre for Cashew, Puttur vide his letter No. F.PA9Tech.Adv)2001 dated 25.1.2001(enclosed) has forwarded comments on this issue and requested to stop aerial spraying till conclusive evidence on the safety of spraying endosulfan is confirmed from the Directorate of Plant Protection, Quarantine and Storage (Department of Agriculture & Co-operation), Haryana.

I therefore regiest that the farmers may be advised to use endosulfan in a most judicious manner by taking necessary precautions. The action taken in this regard may please be informed to this Directorate urgently.

Yours faithfully,

GOVERNMENT OF KERALA

ANNEXURE 08

Abstract

Plantation Corporation of Kerala Ltd - Pollution caused by spraying of endosulfan in Cashew Plantations at Kasaragod - Constitution of Committee to study and analyse the effect of endosulfan on human population and environmental pollution - Orders issued.

AGRICULTURE (PU) DEPARTMENT

G.O(Rt)No.353/2001/AD. Dated, Thiruvananthapuram 23.2.2001

Read:-1) D.O letter No.318/JS(PP)/2001 dated 22.2.2001 from P.D.Sudhakar, Joint Secretary, Government of India.
2) Representation dated 22.1.2001 from the Secretary, Enmakaje, Grama Panchayath, Perla.
3) Representation dated 16.1.2001 from Y.Aravinda, Chair endosulfan spray protest action committee Padra.
4) Representation dated 3.2.2001 from Shri.C.Jayakumar, Co-ordinator Thanal Conservation Action and Informati Network.
5) Report I of the Thanal Conservation and Information Network regarding the preliminary findings of the survey on the impact of Aerial spraying on the people and the ecosystem.

22/02/2001

O R D E R

There are complaints about pollution caused by spraying of endosulfan in Cashew Plantations owned by Plantation Corporation of Kerala at Kasaragod. It is felt that a detaile study and scientific analysis is required about the effect of endosulfan on human population and environmental pollution. In the above circumstances Government are pleased to constitut a committee, to undertake a detailed study and scientific analysis on the effect of endosulfan on human population and environmental pollution, with the following officials:-

.....2/-

Reply dt 12.03.2001

Ann - Page 2

1. Dr.A.Achuthan, Chairman.
   Environmentalist,
   Bilathikulam,
   Kozhikode.

2. Shri.L.Sundaresan, Convenor
   Senior Additional Director,
   (Director in charge)
   Agriculture Department.

3. Dr.K.P.Aravindan, Member
   Associate Professor,
   Pathology, Medical College,
   Kozhikode.

4. Dr.Abdul Salam, Member
   Associate Professor &
   Head of Cashew Research Station,
   Madakkathara,
   Kerala Agriculture University.

5. Dr.Samuel Mathew, Member
   Associate Professor,
   Kerala Agricultural University.

The Committee will submit a report to Government within three months.

By Order of the Governor,

P.K.MOHANTY,
Secretary to Government.

To

Dr.A.Achuthan, Environmentalist,
Bilathikulam, Kozhikode.
Shri.L.Sundaresan, Senior Additional Director,
(Director in charge), Agriculture Department.
Smt.Dr.K.P.Aravindan, Associate Professor,
Pathology, Medical College, Koznikode.
Dr.Abdul Salam, Associate Professor & Head of Cashew-
Research Station, Madakkathara, Kerala
Kerala Agriculture University.
Dr.Samuel Mathew, Associate Professor,
Kerala Agricultural University.
The Health & Family Welfare Department.
P.S to Minister (Agriculture)
PA to Agricultural Production Commissioner.
CA to Secretary (Agri)
Agriculture (Farms) Department.
Stock file/Office copy.

Forwarded/By Order,

Section Officer.

65

GOVERNMENT OF KERALA

Abstract

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Annexure

Plantation Corporation of Kerala Limited - Committee constituted to study the pollution caused by Spraying of endosulfan in cashew plantations at Kasaragod - Terms and Reference of the Committee fixed - Powers of the committee approved and Expenses of the committee sanctioned - Orders issued.

AGRICULTURE (PU) DEPARTMENT

G.O(Rt)No.1191/2001/AD. Dated,Thiruvananthapuram 9.7.2001

Read:-1) G.O(Rt)No.353/2001/AD dated 23.2.2001
2) Letter No.TD(2)61852/2000 dated 3.5.2001 from the Director of Agriculture.

As per the Government Order read as Ist paper above Government constituted a committee to study the pollution caused by Spraying of endosulfan in Cashew Plantation at Kasaragod.The Director of Agriculture has requested to approve the terms and reference and powers of the committee, furnished as per his letter read as 2nd paper above. He has also requested to accord Government sanction for expending Rs.1 lakh.(Rupees one lakh only) from the Head of Account 2401-00-107-83 plan from the current years budget, for meeting the expenses of the committee.

2. Government have examined the matter in detail and are pleased to fix the following terms and references for the committee constituted to study the pollution caused by spraying endosulfan in the Cashew plantations at Kasaragod.

1. To ~~xxxx~~ assess the environmental effects of Endosulfan when used as a pesticide on human beings, Animals, Vegetation and water bodies.
2. Short term and long term toxicity of Endosulfan.
3. Use of Endosulfan as a pesticide in cashew plantation in Kasaragode District as to:
   (a) How long it has been used.
   (b) Details of spraying such as duration, concentration, precautions and safety measures.
4. Examine and furnsih specific cases of complaints.
5. Regulatory status of Endosulfan in other countries.
6. Suggest alternative to Endosulfan for use as ~~xxx~~ peaticide on cashew crop.

.....2/-

65

7. Recommend measures regarding the use of Endosulfan in cashew plantation especially in Kasaragod District.

8. Any other matter connected with the issue, that the committee think essential.

3. The Committee is also entrusted with the following powers.

1. Committee is competent to summon any officer of Government Department, Public Undertakings, Publics and other personalities connected with the issues.

2. Call for the connected records from M/s.Plantation Corporation, Kerala and other Government Institutions for the preparation of Report.

4. Sanction is also accorded to the Director of Agriculture, the convenor of the committee for meeting the expenses of the committee from the Head of Account 2401-00-107-83-Plan from the current years budget limiting the expenditure to Rs.1 lakh (Rupees one lakh only).

By Order of the Governor,

ANI.P.JACOB,
Deputy Secretary to Govt.

To

The Director of Agriculture,
Vikas Bhavan,Thiruvananthapuram.
The Managing Director,
Plantation Corporation of Kerala Ltd.,
Kottayam-686 004.
The the members in the committee (Through Director of Agriculture)

Stock file/Office copy.

Forwarded/By Order,

Section Officer.

Phone: (Office) 08251 21530 (Residence) 08251 26292 Fax: 08251 24350
Grams: CAJUKENDRA, PUTTUR e-mail: root@ncashew.kar.nic.in

ANNEXURE 09

राष्ट्रीय काजू अनुसंधान केन्द्र
(भारतीय कृषि अनुसंधान परिषद)
पुत्तूर, दक्षिण कन्नड, कर्नाटक 574 202.
National Research Centre for Cashew
Indian Council of Agricultural Research
PUTTUR, D. K., Karnataka 574 202, India

डा. ई.वी.वी. भास्कर राव
निदेशक
Dr. EVV. Bhaskara Rao
Director

DO. No. F. PA(Aerial Spray-PCK)/2001
Dated the 8th March 2001

Dear Mr. Balasubramanian:

Please find enclosed a letter addressed to Cashew Research Stations in the country requesting my colleagues to refrain from recommending endosulfan forthwith. This decision has been taken as the best possible alternative available at present to limit the exposure to the endosulfan at least henceforth for the following reasons:

1. Endosulfan has been in use for continuously more than 25 years in spite of other equally effective chemicals are available.

2. Long term exposure to the single pesticide is an unjustifiable practice

3. As Endosulfan has already been in use in a number of crops at least by withdrawing from cashew, to that extent the exposure to the endosulfan can be reduced.

4. This will avoid the possible resistance development in the insect pests due to long term exposure of single chemical which also could be one of the reasons for the failure of effective control of TMB in certain seasons (which need to be investigated further).

As mentioned in the letter this decision to withdraw endosulfan neither support nor contradict its suspected role in the abnormalities reported from Padre village. The Government of Kerala which has appointed a Committee, as per the news report appeared in today's [8 March 2001] Hindu, will only be able to confirm or contradict reported effects due to endosulfan spray, after detailed

study. I shall be grateful if you could kindly communicate this decision to all the Development Departments/Cashew Corporations as the decision of NRC Cashew, Puttur, which is the nodal agency for cashew research in the country.

With best regards,

Yours sincerely,

EVV Bhaskara Rao

(EVV BHASKARA RAO)

To

Mr. PP Balasubramanian
Director
Directorate of Cashewnut & Cocoa Development
8th Floor, Kera Bhavan
COCHIN 682011, Kerala

Copy with compliments to:

1. Mr. P. Gangadharan Pillai, Chairman, The Cashew Export Promotion Council of India, PB No. 1709, Chittoor Road, Cochin 682016, Kerala
2. Mr. K. Sasi Varma, Secretary, The Cashew Export Promotion Council of India, PB No. 1709, Chittoor Road, Cochin 682016, Kerala
3. Mr. Aravinda Y, Chairman, Endosulfan Spray Protect Action Committee, Padre, Yedamale, Via Pela 671552, Kasaragod District, Kerala
4. Mr. G. Giridhara Prabhu, Chief Executive, M/s. Achal Industries, Plot No. 190, Industrial Area, Baikampady, New Mangalore 575011, DK., Karnataka
5. Dr. Rohini Iyer, Principal Scientist & Head, Crop Protection Division, Central Plantation Crops Research Institute, KUDLU POST, KASARAGOD 671 124, Kerala

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Phone: (Office) 08251 21530 (Residence) 08251 20992 Fax: 08251 2435
Grams: CAJUKENDRA, PUTTUR e-mail: root@nrcashew.kar.nic.i

ICAR

डा. ई.वी.वी. भास्कर राव
निर्देशक
Dr. EVV. Bhaskara Rao
Director

ANNEXURE 10

राष्ट्रीय काजू अनुसंधान केन्द्र
(भारतीय कृषि अनुसंधान परिषद
पुत्तूर, दक्षिण कन्नड, कर्नाटक 574 202
National Research Centre for Cashew
Indian Council of Agricultural Research
PUTTUR, D. K., Karnataka 574 202, India

No. F. PA(Aerial Spray-PCK)/2001 **Dated the 8th March, 2001**

To

1. Dr. M. Lakshmi Narayana Reddy, Horticulturist, Cashew Research Station (Acharya NG Ranga Agricultural University), BAPATLA 522101, Guntur District, Andhra Pradesh

2. Dr. PC Lenka, Horticulturist, Cashew Research Station (Department of Horticulture-OUAT), BHUBANESWAR 751003, Orissa

3. Dr. GT Thirumalaraju, Scientist in-Charge, Agricultural Research Station (UAS), CHINTAMANI 563125, Kolar District, Karnataka

4. Dr. SS Shaw, Associate Director of Research, Zonal Agricltural Research Station (IGAU), JAGADALPUR 494005, Kumarwand District, Chhattisgarh

5. Dr. Jahangir Islam, Associate Director of Research, Regional Research Station (BCKVV), JHARGRAM 721507, Midnapore District, West Bengal

6. Dr. M. Abdul Salam, Associate Professor and Head, Cashew Research Station (KAU), MADAKKATHARA 680656, Thrissur District, Kerala

7. Dr. Sumangala Nambiar, Associate Director of Research, Regional Agricultural Research Station (KAU), PILICODE 671353, Kasaragod Dist., Kerala

8. Dr. BP Patil, Associate Director of Research, Regional Research Station (KKV), VENGURLE 416516, Sindhudurg District, Maharashtra

9. Dr. SE Naina Mohammed, Professor & Head, Regional Research Station (TNAU), VRIDHACHALAM 606001, Cuddalore Dist., Tamil Nadu

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Ann 10, page 2

Dear Colleague:

You may be aware of the controversy which is being reported in the print media and also on TV regarding the aerial spraying of cashew plantations with **Endosulfan** in Plantation Corporation of Kerala (PCK), Plantations located in Kasaragod district, Kerala State. As the reports indicated that water bodies are not protected properly during aerial spray, a suggestion has been made to the Director, Directorate of Cashewnut & Cocoa Development, Cochin, Kerala that all the Cashew Corporations in the country may be advised not to resort to aerial spraying with Endosulfan, as the precautions which are mandatory for taking up aerial spraying appear to have not been followed in the right earnestness, while in certain cases, the areas chosen for aerial spraying are unsuitable for this practice. While Endosulfan has been reported to be one of the highly recommended chemical for many crops all over the world and its use has been periodically reviewed by various expert committees including FAO and World Health Organization, the data on long term exposure was not adequate. Recently in February 28, 2001 ***"DOWN TO EARTH"*** periodical a report has appeared which included residue values of endosulfan in the soil, water, vegetables, cows milk and most importantly in the blood samples drawn from residents of Padre village of Kasaragod district, Kerala. This data is the result of analysis carried out by the Centre for Science and Environment (CSE), New Delhi. Dr. Padma S. Vantar under whose guidance the data is reported to have been collected indicated that the residue values especially in human blood, fruits and animal tissue are alarmingly high. At the time when recommendation of endosulfan use on cashew was made, it was the only chemical which was found to be effective in the pest control trials conducted at that time. However, during the IX Biennial Workshop of All India Coordinated Research Project on Cashew held in 4 – 6 October, 1989 at TNAU campus, the data generated in the major cashew growing States, namely, Andhra Pradesh, Karnataka, Kerala, Maharashtra, West Bengal and Tamil Nadu was reviewed and in each of the State in addition to endosulfan other equally effective chemicals like monocrotophos, carbaryl, quinalfos, phosalone and dimethoate were recommended. Subsequently Chlorpyrifos was also found to be effective. Use of Methyl parathion was withdrawn due to high mammalian toxicity.

Further, in the discussions, it was also emphasized that **endosulfan has been used for considerably long period and it is time that alternate chemicals should be used to avoid adverse affect of continued use of a single chemical** both for avoiding pest from developing resistance and long term adverse effect on the environment.

Further, in the 1993 Workshop of AICRP on Cashew held at UAS Hebbal Campus, Bangalore, for aerial spraying new formulation which has been come into the market namely SevinFlo was asked to be used by Corporations. However, as the earlier recommendation of endosulfan was not withdrawn, most of the

7:30

National Research Centre for Cashew, Puttur 574202, K.. .nataka
E-mail. cvvbrao@yahoo.com / nrccaju@vsnl.com

organizations and institutions appear to prefer endosulfan due to the low cost factor. In the present context, environmental protection and human safety should also receive equally, if not more, attention over the simple economics. Long term loss due to the environmental degradation and health hazards will result in much more economic losses than the short term benefit of low cost. Considering all these aspects including the various reports which have appeared in the media recently, it has now been decided to **withdraw the recommendation of Endosulfan for use in cashew cultivation**. There is a very strong argument which is being put forward in favour of endosulfan, that endosulfan is being used not only in cashew, but in many other crops like cotton, vegetables, pulses tea, etc. Therefore it appears sensible option to use other equally effective chemicals in the cashew culture so that at least that much exposure to the endosulfan is reduced. **This decision in no way support or dispute the suspected role of endosulfan in the abnormalities reported from Padre village**, but only to reduce continued exposure to endosulfan. It is requested that your Research Station may **kindly refrain from recommending endosulfan spray for the control of pest in cashew forthwith** and in lieu any effective chemical identified in 1989 Workshop for your State, may be chosen for recommendation.

Yours faithfully,

EVV Bhaskara Rao

(EVV BHASKARA RAO)
DIRECTOR

Copy to:

1. **Director of Research**, Acharya NG Ranga Agricultural University, Hyderabad 50030, Andhra Pradesh/Orissa University of Agriculture & Technology, Bhubaneswar 751003, Orissa/University of Agricultural Sciences, GKVK, Bangalore 560065, Karnataka/Indira Gandhi Agricultural University, Raipur 492012, Chhattisgarh/Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur 741235, Nadia District, West Bengal/Kerala Agricultural University, Vellanikkara 680654, Thrissur, Kerala/Konkan Krishi Vidyapeeth, Dapoli 415712, Maharshtra/Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu

2. The Head, Regional Research Station (University of Agricultural Sciences), Kunjal Road, **BRAHMAVAR 576213, Udipi District, Karnataka**

3. The Head, Agricultural Research Station (University of Agricultural Sciences), **ULLAL 574189, Via Mangalore, DK., Karnataka**

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National Research Centre for Cashew, Puttur 574202, Karnataka
E-mail: evvbrao@yahoo.com / nrccaju@vsnl.com

GOVERNMENT OF KERALA **ANNEXURE 11**

Abstract

Agriculture Department - Use of the insecticide Endosulfan in Crops/Plantations in Kerala - Suspended until further orders - Orders issued.

AGRICULTURAL (FU) DEPARTMENT

G.O(RT)No.1422/2001/AD. Dated, Thiruvananthapuram 25.8.2001

Read: -1) G.O(R:)No.353/2001/AD dated 23.2.2001
2) G.O(R:)No.1191/2001/AD dated 9.7.2001

O R D E R

There are incessant reports in the media regarding the health hazards and pollution caused by the spraying of endosulfan in the cashew plantations owned by Plantation Corporation of Kerala. In the above circumstances Government as per the Government Order read as Ist paper above constituted an Expert Committee to study and submit report on the effect of endosulfan on human population and environmental pollution.

Now Government to order that the usage of the insecticide Endosulfan in Crops/Plantations in Kerala is suspended until further orders.

By order of the Governor,

RAJEEV SADANANDAN,
Secretary to Government.

To

The Managing Director,
Plantation Corporation of Kerala Ltd.,
Kottayam-686 004.
The Director of Agriculture, Thiruvananthapuram.
The Managing Director,
State Farming Corporation of Kerala,
Kannur-691 305.
The Managing Director,
Rehabilitation Plantation of Kerala.
The Director of Public Relations.
The Industries Department.
The Labour Exp & Rehabilitation Department.
Stock file/office copy.

Forwarded/By (illegible)

Section Officer.

72 73

ANNEXURE 12

Red. G4. 4611/2001

Proceedings of the District Collector Kasaragod Dtd:17.2.2001.

(Present: Sri P.C. John, I.A.S.)

. . .

Sub:- Cashew Plantation - Aerial Spraying with Chemical ENDOSULFAN 35% EC over cashew Plantations - Cheemeni and Rajapuram Estate within the Kasaragod District - Permission granted- orders issued.

Read:-Letter No. KSD/GL/24/01 dated: 31.1.2001, 3.2.2001 and 15.2.2001 from the Manager, Plantation Corporation of Kerala Ltd, Kasaragod Estate.

. . .

The Manager, plantation Corporation of Kerala Ltd, Kasaragod Estate in the letter read above has requested permission to carry out aerial spraying operation using chemical Endosulfan 35% EC over their Cashew Estates at Cheemeni and Rajapuram between 17.2.2001 and 3.3.2001.

The Manager has stated that it is proposed to conduct aerial spraying operation by using Helicopter and there is no injenction and other problems connected with spraying in the above Estates.

In this circumstances stated above permission is hereby granted to the Plantation Corporation of Kerala Ltd, Kasaragod Estate for aerial spraying of Endosulfan 35% EC by using Helicopter within the Cheemeni and Rajapuram estate limits only between 17.2.2001 and 3.3.2001 subject to the following conditions.

1) Notice should be given to the public by the Corporation sufficiently in advance of the date of spraying. Notice should be displayed in all the Village Offices, Panchayath Offices and Ration Shops in the area where spraying is done.

2) All the precautionary measures should be taken by the Corporation to prevent water pollution or health hazards to inhabitants in and around the Plantation and neighbouring area as per rules and prevailing directions.

3) The Corporation should arrange to cover all Wells, drinking watersources in and around the locality before spraying.

(contd .....)

Ann 12, page 2 :

4) In the event of any death of cattle occuring in the locality due to aerial spraying, the corporation should arrange to get Post-Mortum Examination conducted at its own cost and pay any compensation in case the death is found to be due to poisoning as result of aerial spraying.

5) This should also be brought to the knowledge of the local publics by wide publicity so that the local publics can report such death of cattle and avail the compensation in all eligible cases.

6) Mike announcement should be made in the area on the day previous to the date of spraying instructing people to take precautionary measures at the time of spraying

7) The Corporation should by all means ensure that the spraying do not cause any enviornmental problems.

This permission is valid only for the period specified above.

Sd/-

DISTRICT COLLECTOR

To

The General Manager, Plantation Corporation of Kerala Ltd,

Regional Office, West Hill,
Kozhikode - 673005.

Copy to: The Manager, Kasaragod Estate, Plantation Corporation Limited, Muliyar,

" " The Revenue Divisional Officer, Kasaragod at Kanhangad.
" " The District Medical Officer, (Health) Kanhangad.
" " The Superintendent of Police, Kasaragod.
" " The Tahsildar, Hosdrug.
" " The Secretaries of the concerned Grama Panchayat.
" " The Village Officers concerned.
" " Stock file of G4.

Forwarded/By order

Junior Superintendent

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21.12/2.

राष्ट्रीय काजू अनुसंधान केन्द्र, पुत्तूर
(भाकृअनुप कृषि अनुसंधान परिषद)

NATIONAL RESEARCH CENTRE FOR CASHEW
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)
PUTTUR 574 202, D.K., Karnataka, India

ICAR

Dr. E V V BHASKARA RAO
DIRECTOR

ANNEXURE 13

No.F. PA(TECH.ADV)/97
Dated: 26 December 1997

To

The Manager
The Plantation Corporation of Kerala Ltd.
Kasaragod Estate
KASARAGOD, Kerala

Sir,

With reference to the enquiry letter No. KSD/GL/24/97/599 dated 23 December 1997, I am to suggest the following:

In the large plantations (over 100 acres) it is difficult to take up the plant protection measures in time to cover the entire area by conventional application through gutter sprayers. Research conducted by CPCRI and NRC Cashew, Puttur clearly established that aerial spraying is the most effective and proper method for taking up pest control measures especially against foliage and inflorescence pests. During the last year there was considerable damage to the crop in both east-coast and west-coast due to tea mosquito bug which causes severe crop loss. The dosage recommended for the aerial spraying is 1% endosulphan (35 EC). However, the following points have to be kept in mind while taking up aerial spraying:

(1) The helicopter should fly at the least height to avoid drift away from the plantations.

(2) Spraying should be taken either early in the morning or late in the evening when the winds are very low so that the spray solution does not escape the plantation area.

(3) The spraying should be stopped at least 10 meters before the end of the plantation so that the drift created by the helicopter movements will be sufficient to take spray solution only till the end of the plantation. This ensures safety for any dwellings which are located near the plantation.

(4) All the drinking water sources as well as water bodies should be properly covered to avoid contamination. The cover should be left at least for one hour after the spraying so that the water is not contaminated by the residual particles of spraying in the wind.

In this connection I am also to mention that aerial spraying trials were conducted in the Plantation Corporation of Kerala orchards and the spraying method was standardised for the first time in the country. A paper published on the experimental results of aerial spraying is enclosed for your ready reference.

Yours faithfully,

EVV Bhaskara Rao

(EVV BHASKARA RAO)
DIRECTOR

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ANNEXURE 14

GL/24/84/648/1

പ്ലാന്റേഷൻ കോർപ്പറേഷൻ ഓഫ് കേരള ലിമിറ്റഡ്
കാസർകോഡ് ഫീൽഡ് ഓഫീസർ കേഷ്യൂ പ്രൊജക്ട്

ബഹുമാനപ്പെട്ട കാസർകോട് കലക്ടരുടെ നിർദ്ദേശ പ്രകാരം പരസ്യപ്പെടുത്തുന്ന നോട്ടീസ്

1989 ഫിബ്രുവരി മാസം 27-ാം തീയ്യതിക്കും 28-ാം തീയ്യതിക്കും ആദ്യം ഡിവിഷനിലെ കശുമാവിൻ തോട്ടത്തിൽ — ാം പ്രാവശ്യം ഹെലികോപ്ടർ മുഖേന മരുന്നുതളി നടത്തുന്നതാണ്. ആ അവസരത്തിൽ കശുമാവിൻ തോട്ടത്തിനകത്തും പരിസരത്തുമുള്ള പൊതുജനം പാലിക്കേണ്ട നിബന്ധകം താഴെ ചേർക്കുന്നു.

1 മരുന്നു തളിക്കുന്ന അവസരത്തിൽ തോട്ടത്തിൽ വെച്ച് പുകവലിക്കുകയോ മുറുക്കുകയോ ചെയ്യുന്നത് ഒഴിവാക്കുക

2 മരുന്നു തളിക്കുന്ന അവസരത്തിൽ തോട്ടത്തിൽ വെച്ച് ആഹാരസാധനങ്ങളും കഴിക്കുന്നത് ഒഴിവാക്കുക

3 മരുന്നു തളിക്കുന്ന അവസരത്തിലോ മരുന്നു തളിക്കു ശേഷം 20 ദിവസത്തിനുള്ളിലോ കാലികളെ തോട്ടത്തിൽ കടന്ന് പുല്ല് തിന്നാതിരിക്കാനും ജന്തുക്കൾക്കും മനുഷ്യനും ആവശ്യമുള്ള കുഴിച്ചുസാധനങ്ങൾ തോട്ടത്തിൽ നിന്ന് ശേഖരിക്കാതിരിക്കാനും കർശനമായി ശ്രദ്ധിക്കുക

4 മരുന്നു തളിക്കുന്ന അവരസത്തിൽ തോട്ടത്തിനകത്തും പരിസരത്തുമുള്ള കിണറുകൾ കോർപ്പറേഷൻ വലവിൽ അടച്ചിടുന്നതായിരിക്കും.

5 തോട്ടത്തിനകത്തും പരിസരത്തും ഏതെങ്കിലും കിണറുകൾ കോർപ്പറേഷൻ അധികാരികളുടെ ശ്രദ്ധയിൽപ്പെടാതെ അടച്ചിടാൻ ബാക്കിയുണ്ടുകയാണെങ്കിൽ കോർപ്പറേഷന്റെ കാസർകോട് ഡിവിഷൻ ആഫീസിൽ അറിയിച്ചാൽ തക്കനടപടികൾ സ്വീകരിക്കുന്നതാണ്.

6 മേൽപറഞ്ഞ നിബന്ധനകൾ കർശനമായി പാലിച്ചതിനു ശേഷവും പൊതുജനങ്ങൾക്ക് എന്തെങ്കിലും കഷ്ടനഷ്ടം മരുന്നു തളിച്ചതുമൂലം ഉണ്ടാവുകയാണെങ്കിൽ പ്രസ്തുത വിവരം ബന്ധപ്പെട്ട അധികാരികളെ ഉടൻ അറിയിക്കേണ്ടതും പരിഹാരമാർഗ്ഗങ്ങൾ തേടേണ്ടതുമാണ്.

ഈ നിബന്ധനകൾ പാലിക്കാത്ത പൊതുജനങ്ങൾക്കുണ്ടാവുന്ന കഷ്ടനഷ്ടങ്ങൾക്ക് കോർപ്പറേഷൻ ഉത്തരവാദിയായിരിക്കുന്നതല്ല.

Copy submitted to the Hon'ble
Kerala Legislative Assembly
for information.

ഫീൽഡ് ഓഫീസർ
CASHEW PROJECT
P. O. [illegible]

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ANNEXURE 15

LIST OF PERSONS / ASSOCIATIONS WHO DEPOSED BEFORE THE COMMITTEE IN WRITING AND / OR ORALLY

1. GOVERNMENT OFFICERS

1. The District Collector, Kasaragod
2. The District Medical Officer, Kasaragod, Kanhangad

2. FUNCTIONARIES OF PANCHAYATHS

1. Sri. Moideen Kunhi Kalnad, Vice President (in charge of President), District Panchayath
2. Sri. V. V. Rajan, Chairman, Stg. Committee, Dist. Panchayath
3. Smt. Mariyamma, President, Mulliyar Panchayath.
4. Smt. Sarada. Y, President, Enmakaje Panchayath.
5. Sri. Kallage Chandrasekhara Rao, President, Bellur Panchayath.
6. Sri. M Kunhambu, Vice President, Pullur - Periya Panchayath.
7. Sri. K.B. Mohammed Kunhi, Chairman, Stg. Comm., Muliyar Panchayath.
8. Sri. K. Sathyanarayana, Member, Bellur Panchayath.
9. Smt. B. Usha, Member, Bellur Panchayath & President Enmakaje Mahilasamajam.
10. Sri. Purushothaman C.V., Chairman, Stg. Comm. Bellur Panchayath.
11. Sri. Balakrishnan M.K., Vice President, Enmakaje Panchayath
12. Sri. M. Jayakara, Chairman, Stg. Committee, Karadka Panchayath.

3. RESEARCH ORGANISATIONS

1. Dr. P. Sivarama Bhat, Scientist, NRCC, Puthur.
2. Dr. K.M. Sreekumar, Asst. Professor of Entomology, College of Agriculture, Padnekkad.

4. PCK LTD.

1. Sri. Devapalan, Senior Manager, Calicut.
2. Sri. Santhosh, Regional Officer, Kasaragod.

5. PESTICIDE MANUFACTURERS & FORMULATORS ASSOCIATION

1. Sri. Pradeep Dave, President, Mumbai.
2. Dr. A.V. Dhuri, Mumbai.
3. Sri. M. Raghavendran.
4. Dr. A. Ramesh of FIPPAT.
5. Sri. Ganesan, Kochi.
6. Sri. Nair.

6. NON-GOVERNMENT ORGANISATIONS

1. Kerala Sastra Sahitya Parishat (KSSP), Kasaragod Dist. Unit.
2. Thanal, Conservation Action & Information Network, Trivandrum.
3. Ban Endosulfan Dist. Co-ordination Committee, Kasaragod.
4. Endosulfan Spray Protect Action Committee (ESPAC), Periya - Padre
5. Kasaragod Jilla Paristhithi Samithi.
6. Indian Youth Congress (I), Pullur - Periya
7. Kasaragod Taluk Azad Cultural Centre.
8. Sri Sakthi Friends Club, Yethadka.
9. Vivekananda Yuvakendra.
10. Punchiri Club, Muliyar.
11. S.V. Brothers Club, Muliyar.
12. Mahilasamajam, Endumoole.
13. Kasaragod People's Forum, Nillipady, Kasaragod.
14. Farm Information Exchange Club, Yethadka.

7. PROFESSIONALS

1. Dr. Y. Mohan Kumar.
2. Dr. Sreepathy Kanjampady.

8. EDUCATIONAL INSTITUTIONS

1. Govt. Highor Secondary School, Padre.
2. S.V.A.U.P. School, Swarna, Padre.
3. P.T.A. of Govt. High School, Bellur.

4. G.U.P. School, Poothamkandam.
5. Eco Club of G.U.P. School, Poothamkandam.
6. Academy Periya, Periya.
7. A.U.P. School, Bovikkanam.
8. A.U.P. School, Yethadka.

9. **GENERAL PUBLIC**

1. Sri. Sree Padre, Journalist, Padre.
2. Sri. Ravindran K.K and 61 others from Pullur-Periya Gram Panchayath.
3. Fr. Vincent D'Souza, Parish Priest, Ukkinaduka.
4. Sri. N. Kumaran, Swarga.
5. Sri. B. Padmanabha Pai, Perla.
6. Representaion in Kannada.
7. Sri. K. Krishna Naik, Yethadka.
8. Sri. K. Subrahmanya Bhat, Padre.
9. Sri. Harinarayanan S., Kumbdje.
10. Sri. M. Sasidharan and 105 others, Pettikundu.
11. Sri. T. Sreenivas, Pettikundu.
12. Sri. Jayakara M. and 8 others, Mullerlys.
13. Sri. Krishna Moorthi, Vaninagar.
14. Sri. Venkataramana Bhat Y., Padre.
15. Sri. Venkataramana Bhat N., Vaninagar.
16. Sri. Govinda Bhat, Bovikkanam.
17. Smt. Seethamma, Padre.
18. Sri. Babu Poojari, Vaninagar.
19. Sri. Madhava Bhat, Padre.
20. Sri. Kesava Sharma Y.S., Kasaragod..
21. Sri. A.K. Gopalakrishna, Balpadithaya.
22. Sri. Sreekrishna Kashyap, Padre.
23. Sri. K. Krishnan Nair, Chengala.
24. Sri. A. Sivasankara Rao, (Not signed, no address, no date). 8'

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25. Sri. Ganadeva Shenoy, Badiyadukka.
26. Sri. Thirupathi Kumar, Badiyadukka.
27. Sri. B. Moideen Kunhi, Badiyadukka.
28. Sri. Aravind P., Badiyadukka.
29. Sri. Abdul Basheer C.A., Kasaragod.
30. Sri. Saji, Kappimala, Kannur.
31. Sri. Rama Bhat, Padre.
32. Sri. K. Ramakrishna Bhat, Padre.
33. Sri. Gopalakrishna Bhat, Padre.
34. Sri. Vasudeva Bhat, Padre.
35. Sri. Sridhara Bhat, Padre.
36. Sri. Ramachandra Bhat, Padre.
37. Sri. Srihari Bhat, Padre.
38. Sri. Narayana Bhat K., Padre.
39. Sri. S. Subba Rao, Padre.
40. Sri. Lakshmi Narayana Bhat, Padre.
41. Sri. Naraya Bhat N., Yethadka.
42. Sri. Seshu Naik, Padre.
43. Sri. Narayana Moolya, Padre.
44. Sri. B. Vishnu Bhat, Padre.
45. Sri. Sathish Kumar P.S. Padre.
46. Sri. S. Subrahmanya Bhat, Padre.
47. Sri. Basheer C.A, Choori.

10. WORKERS OF PCK

1. Sri. P. Rajagopalan and 11 others from Rajapuram Estate.
2. Sri. M. Manu Pattali and 24 others from Perla Division.
3. Sri. K. Bhaskaran Nair and 4 others from Cheemeni Division.
4. Sri. Chaviriyan and 2 others from Periya Division.
5. Sri. K. Narayanan and 3 others from Adur Division.
6. Sri. K. Kunhiraman and 3 others from Muliyar Division.

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ANNEXURE 16

Response from the Centre for Science and Environment to the Chairman of the Committee constituted by the Government of Kerala to enquire into the effects of the spraying of endosulfan in cashew plantations in Kerala.

September 12, 2001

1. *The procedure adopted for collecting the samples*

Sample collection: A researcher Mr Sopan Joshi from CSE went to Padre to organise the collection of samples. Technical guidance on collection and storage of samples came from Dr. Padma Vankar, adviser, *Pollution Monitoring Laboratory, Centre for Science and Environment,* M. K. Prasad coordinator of the Environment Centre of the Kerala Sashtra Sahitya Parishad in Kochi Kerala, and V R Raghunandanan associate professor and veterinary toxicologist with the Integrated Rural Technology Centre, Palakkad. Prof. Prasad and Prof. Raghunandanan had visited the village at the time of collection of samples. Sripati Kajampady, a doctor who runs a nursing home in the neighboring Perla village, helped in collecting samples.

2. *Method used for sample collection:*

a) **Soil:** Soil samples were collected from three sites

- Near the house of D Subba Moolya of Jeentadka area of Kumbdaje village, neighbouring Padre.
- A few metres inside the plantation near the house of Krishna Naik, resident of Kajampady area of Padre. Aerial spraying took place here on Dec 26, 2000
- From the heart of the plantation at the top of a hill in Periyal.

Each surface soil sample (0-10cm), comprised collection from a minimum of 12 cores drew an acre unit with the help of a U-shaped tube of 2.8-cm internal diameter. The cores were pooled and collected in double walled polyethylene bags, transported to the laboratory on the same day, stored in a deep freezer at-15 ^{0}C until analysed. Before extraction, the samples were thawed to room temperature, thoroughly mixed; stones and plant materials were removed. Sub-samples, weighing 50g, were drawn from the representative sample, which were used for residue analysis.

b) **Water:** Water samples were collected from three different sites

- From a small stream in Jeentadka area of Kumbdaje village, neighboring Padre; aerial spraying took place here on Dec 26, 2000

- From a tank in the house of Krishna Naik, about 20 meters from the cashew plantations in Kajampady area of Padre. Aerial spraying took place here on Dec 26, 2000
- From a channel that brings water from the Kodenkiri stream to the farms of S Narayan Bhat, resident of Padre.

Samples (1litre) were collected in clean plastic bottles rinse with the n-hexane. The bottles were tightly capped to prevent contamination of the sample. The samples were stored under refrigeration at 2-4^0 C, until analyzed.

c) **Bovine milk:** Samples of bovine milk were collected from a cow that grazes in the plantation around Krishna Naik's house in Kajampady area of Padre. Its two-month-old calf died after epileptic fits, three days after aerial spraying took place in the area.

Each sample (500 ml) of milk was collected in glass bottles and refrigerated until analyzed.

d) **Blood:** Blood samples were collected from different people.

- Prabhawati Shastri, 46, of Kollenkana, Padre, adjacent to Kodenkiri stream has skin allergies and asthma.
- Vishnu Prasad Kulkarni, 16, has epilepsy and mental retardation
- Mohana Kumar, doctor, living in Kumbdaje village and practicing medicine in and around Padre has chronic throat infections.
- Kittanna Shetty, 21, lives right next to the Kodenkiri stream in Padre, has cerebral palsy. Brother Sridhar 16, suffers from mental retardation
- Muthakka Shetty 50, mother of Kittanna Shetty.
- Lalitha, 35, of Jeentadka, Kumbdaje village, near Padre, has a one-year-old child. Parents of Lalitha died of neurological problems two years ago and her sister Girija died of cancer four years ago. First sister-in-law died of an unknown cause. Second sister-in-law had a miscarriage.

Blood samples (5 ml) were collected in glass vials. Caps of these vials were airtight. The samples were stored at 2-4 ^{0} C until analyzed.

e) **Butter:** Butter sample (10 g), churned from the milk of a 4-year-old cow that grazes around the cashew plantations adjacent to Saletadka Area of Vaninagar, Padre, about 30 metres from the plantation, was collected in a air tight vial and refrigerated until analyzed.

f) **Coconut oil:** Sample (10 ml) of coconut oil was collected fro.n produce of coconut trees about 50 metres from the plantations near the house of

Vishnu Bhat in Saletadka Area of Vaninagar, Padre. Aerial spraying took place here on Dec 26, 2000

g) **Vegetables:** Samples of vegetables, each weighing approximately 500g were collected

- *Basale*, a leafy vegetable eaten likes spinach, from the house of Krishna Naik of Kajampady, *Padre*.
- Pepper bunch from tree close to the house of Krishna Naik in Kajampady area of Padre, about 20 meters from the plantation.

The samples were wrapped in polyethylene bags and immediately transported to the laboratory in Delhi for analysis. The samples were chopped to small pieces and thoroughly mixed. From the well-mixed samples, sub-sample of 50 g was drawn. These sub-samples were analyzed separately for Endosulfan residues.

h) **Fish:** Fish samples were collected from a tank in the house of Krishna Naik, about 20 metres from the cashew plantations in Kajampady area of Padre. The samples were packed in polyethylene bags and transported immediately to the laboratory and stored at -15^0C until analysed.

The sample was thawed in laboratory and inedible portion like head, scales, etc., were removed, then sample was homogenised in a Waring blender. Sub-sample weighing 50 g was taken from the homogenised sample for analysis.

i) **Human milk:** Human milk samples were obtained from a nursing mother, Lalitha, 35, of Jeentadka, Kumbdaje village, near Padre. She has a one-year-old child. Approximately 20 ml of milk was collected with hands in a stoppered glass vial and was stored at -15^0 C until analysed.

All the sample vials and polyethylene begs were transported from Kerala to Delhi in a tightly packed thermacol box with freezol and ice on the same day and were immediately stored in freezer of a refrigerator.

3. *Procedure Adopted for Tests*

Extraction

a) **Soil**

The samples were extracted for residues following the extraction and cleanup procedure of Drager (1969) with suitable modifications. A sub-sample (50 g wet weight of soil) was extracted twice by dipping in a 100 ml of methanol-water

solvent mixture (2:1, v/v) for a day with occasional shaking. After filtration, the extract was partitioned with 100 and 50-ml portions of n-hexane.
The aqueous layer was then partitioned with 50-ml dichloromethane. The combined organic phase of n-hexane and dichloromethane was concentrated to about 5 ml. The concentrated extract normally did not require any further cleanup. The samples, which needed further cleanup, were chromatographed on silica gel using n-hexane and n-hexane-acetone (4:1, v/v) as eluants

All the samples were also extracted by Soxhlet extraction method. A subfraction of 50g was taken in thimble. Thimble was set in Soxhlet extractor and extraction with 300ml of hexane: acetone (80:20, v/v) was carried cut for eight hours. The organic phase then concentrated to 5 ml and clean up was done as mentioned above

b) Water:

Water samples (500 ml) were shaken well and filtered. After filtration, the extract was partitioned with 100 ml portions of n-hexane (twice) after addition of 10 ml of saturated NaCl solution. The aqueous layer was again extracted with 50 ml of n-hexane. The combined organic phase of n-hexane was then passed though anhydrous sodium sulfate and concentrated to about 5 ml. by rotatory vacuum evaporator. The concentrated extract normally did not require any further cleanup. The samples, which needed further cleanup, were chromatographed on Silica gel using n-hexane-acetone (4:1, v/v) as eluants.

C) Bovine milk:

Extraction and cleanup of the milk samples was accomplished by suitable combination of the extraction method of de Faubert Maunder et al, (1964) and cleanup technique of Veirov and Aharonson (1978). A sub sample of milk (5 ml) was homogenised with 40 ml of acetone-hexane (1:1, v/v) mixture. The homogenate was allowed to stand till a clear separation into two layers occurred. After the removal of the upper organic phase, the lower aqueous phase was re-extracted twice with n-hexane (40 ml). The combined organic phase was evaporated till free of the solvent. The residue was dissolved in 40 ml of petroleum ether (B.P. 60-80 ^{c} C) and was cleaned up by drop-wise addition of 40 ml of concentrated sulphuric acid (sp. gravity 1.84). The petroleum ether fraction was washed with distilled water till neutral to litmus and concentrated to a suitable volume.

d) Butter fat:

The method described by de Faubert Maunder et al. (1964) with slight modifications was used to extract and isolate organochlorine residues from butter sample. Butter was warmed at about 50°C to separate the fat which was filtered through dry filter paper. A 5-g sample of the clarified fat was dissolved in 10 ml of

hexane and transferred quantitatively to a 125-ml separatory funnel. The hexane extract was partitioned three times into dimethyl formamide (hexane saturated), using 10 ml of solvent each time. The dimethyl formamide after back washing with 10 ml of hexane (dimethyl formamide-saturated) was diluted with 250 ml of water and 50 ml of sodium chloride-saturated aqueous solution, and was extracted twice with 100 ml of hexane. The combined n-hexane extract was concentrated to about 5-10 ml and clean up was done on silica gel column.

e) Vegetables:

The procedure of Mills et al. (1963) with slight modification was followed for extraction of organochlorine insecticide residues. Sub-sample (50 g) was blended with 100 ml of acetonitrile for 2-3 minutes in the Waring blender. The macerate was filtered through a suction filter using mild vacuum. The filter-cake was blended again with 100 and 50 ml of acetonitrile and filtered. The blending jar and the filter were rinsed with additional 50 ml of acetonitrile. The filtrates and the washings were combined, diluted with volumes of water and 30 ml of sodium chloride saturated aqueous solution and then partitioned thrice using 100, 50 and 50 ml of petroleum ether (BP 60-80^0 C). The petroleum ether fraction after concentration to a small volume by rotatory vaccum evaporation was further cleaned up by column chromatography using silica gel as an adsorbent (Joia et al. 1987). The eiutes were concentrated to small volume for analysis.

f) Fish:.

Sub-sample (50 g) was homogenised with 100-ml acetonitrile and 25 ml of distilled water in a Waring blender for 3 minutes at high speed. The homogenate was filtered and the residual material was re-extracted with 100 ml of methyl cyanide and 15 ml of distilled water. The filtrates were combined and the aliquot equivalent to 10 g of the sample was transferred to a 1 litre separatory funnel. To it, distilled water (250 ml), n-hexane (100 ml) and brine solution (50 ml) were added. The contents were shaken for few minutes and allowed to stand till there was complete separation of two layers. The upper organic layer was removed and the lower aqueous layer was re-extracted with 50 ml n-hexane. Both the n-hexane fractions were combined, washed with distilled water and then dried over anhydrous sodium sulphate. The n-hexane fraction was concentrated to 20 ml by rotatory vaccum evaporator. Further cleanup was done after passing through silica gel column topped with anhydrous sodium sulfate.

g) Biopsy animal tissue:

Samples weighing approximately 3-5 g were admixtures with about 20 g anhydrous sodium sulphate and were extracted thrice with n-hexane after thorough maceration. The n-hexane extract was partitioned three times with an equal volume of acetonitrile containing 10 per cent water. The combined aqueous acetonitrile phase, after dilution with 3 volumes of water and 10 ml of

brine solution was partitioned twice using 100 and 50 ml of petroleum ether (BP 40-60^{0}C). The combined petroleum ether phase was concentrated to about 5-10 ml and chromatographed on activated silica gel.

h) **Milk:**

Extraction was done according to the method of Brevik (1978) with slight modification. A sub-sample of 50 ml was extracted with 2 volumes of n-hexane-acetone (1:1, v/v) mixture The homogenate was allowed to stand till clear separation into two layers occurred. After the removal of organic phase, the lower phase was re-extracted twice with 15-ml portions of n-hexane. The combined n-hexane extract after concentration to 20 ml was transferred to a separatory funnel, to which 5-ml conc. Sulphuric acid (sp. Gr., 1.84) was added dropwise. The contents in the separatory funnel were shaken and allowed to stand. The lower sulphuric acid layer containing digested fat was discarded. The n-hexane phase was washed with distilled water till neutral to litmus and concentrated to a small volume.

I) **Blood:**

2-ml blood sample was taken in a stoppered vial and 10-ml hexane was added. Centrifuged it and repeated twice. Combined the hexane extracts and concentrated by rotatory vaccum evaporation and dried. Final sample was prepared after addition of 2 ml of HPLC grade solvent and was analyzed on GC-ECD.

4. *Method Used for Analysis*

The residues in HPLC grade hexane were analyzed on Gas chromatography (GC-Trace, Thermoquest) equipped with electron capture detector by injecting 1ul sample. The operating parameters for Endosulfan were as follows:

Temperature conditions:

Column: DB-17 (capillary column, DB-17, length 30m, ID 0.25mm, film 0.25mm)
Oven: 200 ^{0} C
Injector: 250 ^{0} C
Detector: 250 ^{0} C
Flow rate: 3ml/min (carrier gas N_2)

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5. *Information as to whether tests were done to detect α and β endosulfan and also sulfate.*

α and β isomer of endosulphan were analysed only. Due to unavailability of standard for endosulphan sulphate it was not evaluated.

6. *Facilities in Pollution Monitoring Lab:*

The Centre for Science and Environment's Pollution Monitoring Laboratory is very well equipped for the pesticides (organochlorines and organophosphorus) monitoring in different types of matrix. Instrument available: Trace Gas Chromatography (Thermoquest) with ECD, FID and TCD detectors. High Performance Liquid Chromatography (Agilent 1100) Hewlett Packard, UV-VIS Spectrophotometer (Cintra 5), Ultra pure Water System (USF Alga), Weighing balances for micro and macro weighing.

7. Name and Status of the Scientists Involved in the study:

Supervisor for the sample collection, extraction and analysis:

Dr P S Vankar
Head
Facility of Ecological and Analytical Testing Laboratory
IIT, Kanpur

8. Name and address of the Laboratory

Pollution Monitoring Laboratory
Centre for Science and Environment
Core 6-A, 4th Floor,
India Habitat Center,
Lodhi Road,
New Delhi –110003
Phone: 464 5334
Fax: 464 5335
Email: satija@cseindia.org

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ANNEXURE 17

Indian Council of Medical Research
Ansari Nagar, New Delhi-110 029, India

No. 3/4/10/(1)/14/2001/ 3876

11 October, 2001

Dr. A. Achyuthan,
Chartered Engineer,
Chairman,
1/3780 Amulyam,
Bilathikulam,
Calicut,
Kerala State -673006

Dear Sir,

I am in receipt of your fax letter dated 8-10-2001 regarding the Enquiry on the Endosulfan spraying in the Cashew Plantations in the Kasargode District of Kerala State. In response to that I wish to state that immediately following reports published in National Dailies and popular Magazines, the Hon'ble National Human Rights Commission (NHRCA) took suo moto action (Case No. 61/11/2001-2002 (Fc) dated 24-7-2002) on the same and amongst others asked Director General, Indian Council of Medical Research (ICMR) New Delhi to submit the requisite information/report within four weeks. The Director-Genera. ICMR in turn asked Director, National Institute of Occupational Health (NIOH), Ahmedabad to take necessary action.

NIOH, Ahmedabad, has taken action as follows:

1. A 3-member team of senior Scientists including Director from NIOH made a preliminary visit to Kasargode District 8-11 August 2001 and held first-hand discussions with the District authorities and people of affected villages, and also visited some Schools in Padre village. It was felt that there is an excess incidence of congenital malformations, subnormal mental development in children, neurological disorders, various forms of cancers in certain villages of Kasargode District of Kerela which needs to be investigated and confirmed scientifically through well planned environmental epidemiological studies of the affected villages and control population and investigate causative factor(s) including Endosulfan.

2. After discussions with senior members of the Scientific Advisory Committee of NIOH and its Scientists and taking into account the topography of the area, it was decided that the first phase of the study will be carried out in School children and their family members. Special Questionnaires were designed for children and families The Department of Pediatricts, Kasturba Medical College (KMC) Mangalore, under Dr. U.V. Shenoy agreed to carry out medical examination of the children. The study group consisted of 640 children from Govt. Higher Secondary School P.O. Vaninagar and control group of 414 children from Sri Vidya Vardanka High School and Vani Vilas aided L.P. School at Miyapavadu in Meenja Panchyat. The children were asked to bring their parents and medical examination was carried out after obtaining written consent from one of the parents. Family history of specific diseases and exposures was also recorded simultaneously. Same methodology was followed for the study and control groups. Environmental and biological samples have also been collected from both the areas and the field work has just been completed on 7-10-2001.

3. The data entry, analysis and laboratory investigations will take about two months time and the preliminary report will be available by end of December 2001. However, we intend to do further detailed investigations in positive cases. It would be scientifically incorrect to arrive at any conclusion without analyzing the data.

4. I request you to send us a copy of the findings of your committee as this will help us in reaching final conclusions.

Thanking you,

Yours faithfully,

(Dr. H. N. Saiyed)
Director

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ANNEXURE 18

First Convict the Suspect and Later Conduct the Trial

Dr. EVV. BHASKARA RAO
Director
National Research Centre for Cashew
Puttur - 574 202, DK, KARNATAKA
India

This title was chosen as it very aptly sums-up the present controversy of endosulfan spraying on cashew plantations in the Padre village in northern Kerala. Since about six months, series of reports have appeared in the print media and also some are floating on Internet on the "devastation and misery" caused on the population in Padre village in northern Kerala by "spraying of endosulfan" to protect cashew plantations from the infestation of a serious pest "Cashew Tea Moquito Bug (TMB)".

All the reports carried photographs of same set of unfortunate children born with physical deformities – "congenital anomalies". McGraw – Hill Encyclopedia of Science and Technology defines congenital anomalies as "Birth defects may be inherited or produced by external factors, however, the CAUSE OF MOST ANOMALIES IS UNKNOWN" (Vo.4 Page 325 6th edition). Further, while dealing with etiology of these anomalies states "some are genetically controlled, some are caused by environmental insults and other reflect interactions of genetic background and external agents. For most human anomalies "it is not possible to identify the causative mechanism". Not so for the anomalies noticed in Padre Village. All the reports unequivocally confirm that the causative agent is "Endosulfan". The very titles of reports – "Children of Endosulfan" (Down to Earth, February 28, 2001), Spray of Misery (India Today, July 23, 2001), Cashews for human life (The Hindu, July 23, 2001) and host of other vernacular reports in Malayalam and Kannada papers substantiate the causative agent as "Endosulfan". Well the suspect is already found and "confirmed"! First sentence it, evidence and proof can be found out later..... appears to be the pulse.

Now let us look on the case details. The research conducted by the plantation crop scientists in early 70's came out with the conclusion that endosulfan is the best insecticide chemical for saving the cashew crop from the dreaded pest TMB. In order to facilitate timely application in

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large areas, based on the trials conducted it was found that aerial spraying is the best and economical for large plantations. When the recommendation was given on this aspect for taking up the spraying by Plantation Corporation of Kerala and other corporations like, Karnataka Cashew Development Corporation, Andhra Pradesh Forest Development Corporation, Orissa State Cashew Development Corporation etc. only the Plantation Corporation of Kerala was regular in taking up the aerial spraying while the rest took up aerial spraying on and off.

Recently, a number of media reports appeared implicating that the endosulfan spraying was responsible for the deformed births, epilepsy, cancer, cerebral palsy and host of many other ailments in Padre village and on the manifestation of toxic effects of endosulfan residues. Even the suicides committed in this village were implicated for the spraying. Even before these recent reports, much earlier in 1997, Dr. YS Mohana Kumar, a doctor practicing in the village brought this unusual occurrence of high proportion of congenital deformities in an article in Kerala Medical Journal. He states "I feel the root of the problem lies in the water itself which might contain a mineral or radioactive substance which is harmful to the brain". The recent report in Hindu Magazine mentions that Shree Padre a progressive farmer, way back in 1981 noticed that "something was very wrong in this area". All these cases numbering about 197 are reported to be from 123 houses. Except the report which appeared in Down to Earth, by Centre for Science and Environment (CSE), there are no other reports indicating such high values of endosulfan residues from anywhere.

However, the report published on endosulfan has many contradictions including questionable procedure adopted in conducting these tests. An eminent scientist, Dr. S.K.Handa has published an article "Report on Endosulfan – Deviation from truth" (in Pesticides Agriculture Today, June 2001) wherein he questions the very objective of this study by saying "The study is contradictory in itself and the results obtained are highly questionable. It appears that the CSE approach is to present the situation in Kerala in a peudo-scientific way with a motive to get the product banned in the country".

Now coming to the studies undertaken by Centre for Science and Environment scientists', the procedure adopted certainly looks biased. In any of the studies of this nature, the most logical option would be to collect random samples from the people including both healthy and affected and analyze them after coding the samples and try to correlate the residues with maladies. But residue level reported in water, butter, cow's milk, coconut oil indicate the possibility that almost every person in Padre village should have residues in their blood samples and these are most common item which are consumed by every person. Further it is possible that even persons in neighbouring village who consumed milk from Padre village must have been affected by residues in milk as even the "stall fed cow milk" was

reported to be having the endosulfan residues. Probably this could be the reason for Dr. Handa's comments "it appears CSE approach to the present situation in Kerala in a pseudo-scientific way with a motive to get the product banned in the country". The intention is not to find only faults in the results reported by Centre for Science and Environment. It is very clearly mentioned in one of the earlier communication that "environmental protection and human safety should also receive equal if not more attention over simple economics". Therefore, while the deformities reported are certainly alarming, the conclusion drawn on the effects of endosulfan residues are still to be validated scientifically.

Now let us deliberate on the various implications of the reports and possible surmise one can arrive at. The statistics say that over 1.9% of the population (i.e. 16.5 million people) are handicapped through congenital defects in India. If the endosulfan is the only culprit in inducing congenital deformities which are reported in Padre village and what could be the reason for high proportion of defects in Indian population. There is no way to justify the conclusion that only endosulfan spray is responsible for deformities as reported.

The second aspect which also needs attention is as per the Centre for Science and Environment reports, the samples collected from the village such as cow's milk, coconut oil, vegetables contain residues in a very large proportion. If so, the whole of the village population must have been exposed to these products as it is common to presume that the people would have consumed the milk, vegetables and water. Then, why only few people from 123 houses only were affected while others are free from these ailments. Normally in the food poisoning reports in the media like illicit liquor cases or food poisoning in the functions, almost all the people who have consumed the contaminated materials are reported to be affected.

One important aspect which needs to be looked into is the status and structure of the population in this village. Many of the people who are affected with these maladies are reported to be related to each other, socially backward and economically poor, as per the reports which appeared in the media. The possibility of inbreeding by marriage between close relatives in these families over a period of time also could have contributed to the congenital defects and passed over to present generations. Ms. S. Usha, Research Associate with INTACH who conducted a survey among 250 families in this area may be able to throw more light on the inbreeding aspect which may be responsible for infertility, regular miscarriages and hormonal problems which she noticed in some village families.

The third consideration which also should be looked in to is the possibility of use of prohibited drugs (medicines) during the initial stages of pregnancy which is also reported to result in birth defects. Dr. YS Mohana Kumar who has been practicing in this region for a number of years may be able to enlighten on the medical history of these people.

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The scientific reports available on residues of endosulfan are reproduced below:

I. "endolsulfan residues on cowpea reach below the maximum residue limit of 2 ppm within 4 days" (Naseemia Beevi and others 1995)

II. "endosulfan can be considered as an environmentally sound insecticide for use under subtropical conditions" (Trilochan 1997)

III. "Among eight insecticides field tested endosulfan proved to be least disruptive to honey bee (Rathore and other 1997)

IV. "endosulfan has no carcinogenic potential, the chronic toxicity and carcinogenicity study gave no indication of any oncogenic potential of endosulfan in rats and mice (Hack and others 1995).

V. Endosulfan is not highly persistent in the environment. For most of the fruits and vegetables 50% of the residues are lost within 2-7 days. In animals endosulfan is metabolized and excreted in urine and does not accumulate in milk, fat or muscle (Kidds and James, the Agrochemical hand book 1991).

VI. "No genotoxic activity was observed in an adequate series of tests for mutagenecity and clastogenecity in vitro and in vivo (Pesticide Residues in Food - Report of the 1998 joint FAO/ WHO meeting of experts)

Well how do we conclude now in the light of above reports. Can we out- rightly reject either the reports appeared on endosulfan in our media or the above listed reports. The logical synthesis will indicate that there should be more intensive scientific enquiry in what actually is the cause for maladies in Padre village. Drawing conclusions on premises and presumption can only create controversy and but not give a solution. Some of the catching captions can even cause considerable damage also. For example the report in The Hindu "Cashew for Human Life" can scare away the importers from Indian cashews for no fault of cashew. None of the reports from experts on pesticides residues contain any reference to presence of endosulfan residues in cashew kernels. As mentioned in the beginning the etiology of congenital defects is still to be understood properly. Let us understand clearly the problem first. The deformities in Padre village is a fact which every one should accept but "cashew causing misery", "children of endosulfan" "spray of misery" are fantacies of individuals which in no way would help poor handicapped children of Padre except to parade them naked in print and visual media before the world.

Before we sign off one nagging thought remains unanswered. Reports indicate that abnormalities were noticed first in 1981, in 1997 report of possible effect of radiation was aired but in both the instances very little publicity was given for these reports. Surprisingly, in 2001 there is a blitz in the media. May someone help us to understand the phenomena and the motive behind the wide publicity that has gained. ■

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ANNEXURE 19

Residues of endosulfan in environmental samples collected from the Padre area of Kasaragod District.

Date of spraying : 26-12-2000 Date of sampling : 19-02-2001

Name of Laboratory : Regional Analytical Laboratory, Aromatic & Medicinal Plants Research Station, Odakkali (ICAR)

Sample	Lab. No.	Place of collection	Endosulfan residues (ppm)		
			α isomer	β isomer	Total
Water	1	Small well in the household of Sri. Koragappa Rai adjacent to PCK estate, Padre	ND	ND	ND
	2	- do -	ND	ND	ND
	3	Open pond in the household of Sri. K Viswanatha Bhatt, adjacent to PCK estate, Padre	ND	ND	ND
	4	*Pokka* deep well in the quarters situated in the midst of Perla estate of PCK estate, Perialadka	ND	ND	ND
	5	Swarga rivulet downstream of Swarga	ND	ND	ND
Soil	1	Household of Sri. Koragappa Rai adjacent to PCK estate, Padre	0.0115	0.0434	0.055
	2	Sediment in the open pond in the household of Sri. K Viswanatha Bhatt, adjacent to PCK estate, Padre	0.0028	0.3120	0.315
	3	Back yard of the quarters situated in the midst of Perla estate of PCK estate, Perialadka	0.4210	1.9770	2.398
	4	Alley way in the midst of PCK estate in Perialadaka	0.3270	0.557	0.884
	5	- do -	1.220	2.595	3.815
Cashew leaves	1	PCK estate along the side of Swarga-Galigopura Road	ND	0.858	0.858
	2	PCK estate, Perialadka, Site-1	ND	0.681	0.681
	3	PCK estate, Perialadka, Site-2	ND	0.507	0.507
Pepper berries	1	Household of Sri. Koragappa Rai adjacent to PCK estate, Padre	ND	ND	ND
Betel leaves	1	Household of Sri. Koragappa Rai adjacent to PCK estate, Padre	ND	ND	ND

ND = Not detected

Detection limit : Water : 0.5 ppb

Soil, Plant samples : 10 ppb

The results are interpreted below.

94 95

Ref:G4.4011/01

Collectorate, Kasaragod
Dated: 5.9.2001.

From

The District Collector,
Kasaragod

Annexure 20 -?

To

Dr. A. Achyuthan,
Chairman,
1/3780, Amulyan,
Bilathikulam
Calicut - 673006.

Sir,

Sub:- Spraying of Endosulfan in Cashew Plantations of PCK, Ltd. - study of effects - Reg.

Ref:- Your letter No.AA/Endo/08/2001, dated 22.8.2001.

.....

Please refer to the letter cited. The permission to carry out Aerial spraying operation by using Chemical Endosulphan 35% E.C. have been granted to the Plantation Corporation of Kerala as and when requests are made by the Plantation Corporation of Kerala. Copies of orders granting permission for aerial spraying for the years 1998 to 2001 are enclosed for reference. The copies of orders relating to the entire periods are not readily available.

2. Necessary conditions were stipulated in the order granting permission to take all precautionary measures to prevent water pollution and health hazard to the inhabitants in and around the Plantation and neighbouring area. But the Corporation had conducted aerial spraying without taking proper precautionary measures and the spraying was conducted not within the stipulated period for which permission was granted.

3. Procedure adopted to monitor the effects of spraying on human population and flora and farna is being ascertained and will be let you know soon.

4. Several complaints have been received against the aerial spraying in Enmakaje and Ballur Grama Panchayaths. The District Collector has discussed about the objections raised by the public organisations with the Plantation Corporation of Kerala authorities and order prohibiting the

P.T.O.

plantation Corporation of Kerala from aerial spraying was promulgated on 21.8.2001.

Yours faithfully.

Deputy Collector(Housing)
for Collector.

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ANNEXURE 21

Household Survey to Assess the Health and Environmental Impact of Aerial Spraying of Endosulfan in PCK Cashew Plantation of Kasargode District

Kasargode District Committee
Kerala Sastra Sahitya Parishad

August 2001

96 98

Background

Ann 21, page 2

Padre village in Kasargode district has become the focus of international attention recently. A large number of inhabitants in the village are said to have physical deformities, disorders of the central nervous system and a various other diseases. A local doctor and journalist were the ones who focused attention on the problem. They believed that the spraying of the pesticide Endosulfan by the Plantation Corporation of Kerala was the cause.

Plantation Corporation of Kerala maintains a 2200 hectare Cashew estate that abuts 7 Panchayaths of the district. Aerial spraying of Endosulfan by helicopters has been going on for nearly two decades to counter the pest '*tea mosquito bug' (Helopeltis antonii* S). The estate is situated amongst a heavily populated area and people live even within 100 meters of its borders.

Endosulfan is an organochlorine chemical. It is a cream-to-brown-colored solid that may be in crystals or flakes and smells like turpentine and is an insecticide used to control insects on grains, tea, fruits, vegetables, tobacco, and cotton.. Sold as a mixture of two different forms of the same chemical (alpha- and beta-endosulfan), it degrades into the sulfate form in the soil.

Endosulfan enters the environment primarily through spraying on farm crops. It does not dissolve easily in water. In soil, some endosulfan evaporates into air and some breaks down. It may stay in soil for several years before it all breaks down. It may accumulate in the bodies of fish and other organisms that live in endosulfan-contaminated water.

Endosulfan mainly affects the central nervous system. Accidental ingestion and breathing of high levels of endosulfan results in convulsions and death. Hyperactivity, tremors, decreased respiration, and salivation have also been noted in people who ingested high levels of it. These levels are many thousands of times higher than the average exposure. We don't know the effects from long-term exposure to low levels of endosulfan. Animal studies have shown effects on the kidneys, testes, developing fetus, and liver from longer-term exposure to low levels of endosulfan. The ability of animals to fight infection was also lowered. It is also now known to be an endocrine disrupting chemical with estrogen like actions.

Kerala Sastra Sahitya Parishad (KSSP) is a People's Science Movement with grassroots workers in all districts of the State. We, the KSSP district committee of Kasargode considered this a serious issue that needed a scientific study. We felt that chronic low dose

Any 21-pages

toxicity in humans though not documented in scientific literature is plausible in this case, given the peculiarities of terrain and habitat as well as continued aerial spraying with inadequate precautions over a long period. It is difficult to establish cause-effect relationships by chemical measurements in low-level exposures, particularly for birth defects, mental retardation etc. For this reason we felt that a household survey for measuring disability and morbidity and comparison with the population of the state (for which data exists) would be invaluable. The survey was designed and conducted with the help of the KSSP Environment center, Thrissur.

Objectives

To assess

1. Whether proper safety precautions were observed during aerial spraying of Endosulfan by the PCK plantations
2. The impact of the pesticide spraying on the environment around the PCK plantations
3. The impact on human health particularly in relation to the rates of disability, chronic morbidity and reproductive health

Methods

Household survey was conducted in 7 panchayats surrounding the Plantation area. The households situated within 500 meters of the plantation border were the ones surveyed. Questionnaire was prepared by the Environment sub-committee of the Kerala Sastra Sahitya Parishad. The volunteers for the household survey were given one day training held at Cheemeni, Chalinkal, Panathadi, Rajapuram, Mooliar, and Badiyadukka.

A total of 747 househols having 4102 inhabitants were surveyed. The breakup of household according to the Panchayats is given below.

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Table 1

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Distribution of the sample

~~Panchay~~at / Blocks / Division	Number of households
Area A	
Cheemeni	288
Panathur	43
Rajapuram	126
Periya	33
Kottur	70
Moolikkadavu	34
Area B	
Enmakaje	153
Total	747

Results

Demographic and household details

Tables 2 and 3 show relevant demographic details. Consanguinity rates are similar in the two study areas. The proportion of childless couples is about three times higher in Enmakaje (Area B) compared to the other areas. In both areas the vast majority have been in residence for more than 10 years.

There is a striking difference in the main source of water in the two areas. (Table 4). In Enmakaje more than one third the population depends mainly on Surangams to meet their water needs.

Table 2

Some demographic features in the sample

Parameter	Area A	Area B	All
Sample size	3092	1010	4102
Family size	5.21	6.6	5.49
Consanguinity rate (per 1000)	6.3	7.4	6.6
Childless couples (per 1000)	6.6	18.6	9.0

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Table 3

Years of residence in the area (% of families)

Area	< 5 years	5 - 10 years	> 10 years
Area A	10.8	12.8	76.4
Area B (Enmakaje)	8.5	7.8	83.7
All	10.3	11.8	77.9

Table 4

Main water source of the households (%)

Area	Well	Tube well	S angam	Other
Area A	87.9	6.1	5.2	0.8
Area B (Enmakaje)	54.2	0.6	36.6	8.5
All	81.0	5.0	11.6	2.4

Table 5

Answers to questions asked to assess observance of safety precautions by the company and people (% of families)

Response	Area A	Area B	All
Company informs us prior to spraying	51.9	18.3	45.0
Company supplies material to cover water bodies	36.4	3.3	29.6
Spraying done only during stipulated time	29.2	11.8	25.6
Wells are covered during time of spraying	47.6	9.2	39.8
Keep indoors during spraying time	25.4	18.3	24.0
Pesticide falls in the compound	66.7	75.5	68.4
Pesticide falls on body of family members	53.0	75.2	68.4

Obsevance of safety regulations

Data in Table 5 shows that safety precautions are not practiced satisfactorily by the company and the majority of r[illegible]. This is more strikingly so in Enmakaje. (The somewhat better

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COMMUNITY HEALTH CELL
LIBRARY AND DOCUMENTATION UNIT

Ann 21 page 6

figures in the rest of the areas are mainly due to the data from 288 households in Cheemeni Panchayath where there were some protests in the early 1990s.)

Majority in both areas testified that spraying is done throughout the day and not merely in the stipulated time.

Further it was unanimously claimed that the height from which spraying was done is much mor e than the mandated 5 meters.

Environmental impact

In both areas (more in Enmakaje) a majority of observants felt that there has been a reduction of small animals like fish and frogs in the area in recent years after the spraying of pesticides started. Fish kills with floating dead fish is said to be common occurrence. Bee rearing was a common practice previously. Now most people have given it up because bees do not return after flying off to gather honey. Putting the soil from the area into river water often resulted in fish kills.

Birds are strikingly few in Padre (Enmakaje Panchayath). So are frogs and fish according to residents. Squirrels have virtually disappeared. People in all areas said that animals dying after spraying was common. Snake deaths are reported from Periya.

Infertility in cattle was reportedly very high in Enmakaje.

Table 6

Answers to questions asked to assess environmental impact (% of families)

Question	Response	Area A	Area B	All
Are there infertile cattle in you house?*	Yes	6.3	42.5	18.1
Are there cattle with birth defects in your house?*	Yes	4.8	6.3	5.3
Do you feel that there has been a reduction of small animals like frogs, fish and bees in recent years ?	Yes	40.2	79.7	48.3
	No	14.4	9.8	13.7
	Don't know	39.2	10.5	33.3
Is it common to find dead fish, frogs etc. in the aftermath of spraying?	Yes	37.5	74.5	45.1
	No	14.8	15.7	15.0
	Don't know	48.8	7.8	40.4

* denominator is households owning cattle

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Disability and Chronic Morbidity Ann 21, page 7

Disability rate is 73 % higher in Enmakaje compared to the rate in Kerala according to the State level household health survey conducted by Kerala Sastra Sahitya Parishad in 1996. If locomotor disability and mental retardation alone are considered, it is higher by 107%. Likewise Chronic morbidity is higher by 70 % in Area B compared to Kerala in the KSSP study. Both total disability and chronic morbidity are not significantly different in Area A when compared to the State figures. (Tables 7 and 8)

Table 7

Disability rates (per 100000)

Disability	Area A	Area B	All	Kerala 1996 (KSSP)
Locomotor	614	693	634	377
Hearing	162	495	244	488
Visual	226	297	244	133
Mental Retardation	129	594	244	244
Total	1132	2079	1365	1202

Table 8

Chronic morbidity per 1000 (excluding Diabetes, hypertension and Arthritis)

Sample	Rate
Area A	52.1
Area B	107.9
All	65.8
Kerala 1996 (KSSP)	63.6

Discussion

What emerges from the study is that a chemical, hazardous to humans and the Environment has been used for nearly two decades with reckless abandon. Stray protests apart, the people were also not aware of the toxicity or potential long term effects.

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In all areas surveyed, it is abundantly clear that the proper precautions were ignored and rules flouted by the company. Aerial spraying is practiced in countries like Australia and the US where there are vast stretches of farmland on flat terrain. Here, on the other hand, is an undulating terrain heavily admixed with human habitation. It is impossible to spray from a height of less than 5 meters, and frequently the spraying was done above a height of 10 meters or more, thus increasing the chance of drift into the surrounding houses and water bodies.

The Environmental impact was also seen in all areas studied. Though higher in Padre village of Enmakaje, none of the other areas were exempt. The human health indicators however showed a difference. In Enmakaje – focus of the controversy – the disability rates were nearly twice that of the State average. Chronic morbidity was also significantly higher. There was no significantly high level of consanguinity. Moreover, the problems were mostly seen in the young, and according to the residents, was not known a generation ago.

In the other areas, disability and morbidity indicators were not significantly higher than the state average and hence the environmental assault is of a lesser magnitude. The reasons for this difference has to be studied. One possible reason relates to the water source in the two areas. In Padre, large number of families depend exclusively on Surangams. They are tunnels cut through rock that collects rainwater from the hilly catchment above. In case of Padre, polluted water from the plantation in the hills above. Continuous consumption of this water for a long time can mimic health effects produced in animal studies. Exposure to expectant mothers could result in birth defects to the fetus and the estrogenic effects could result in reproductive failure in adults.

This study does not furnish absolute and final proof that Endosulfan has produced all the health problems in Padre or Eco-damage in the whole region. But such proof cannot by obtained by any kind of study. There is however, sufficient reason to suspect it as the most likely contributing cause.

The burden in such cases -- especially when human life and health is in peril - should not be to prove the cause-effect relationship, but rather to disprove it.

There is sufficient reason to discontinue the use of Endosulfan in the Cashew plantations of Kasargode district and seek alternate pest control measures. Any Economic or 'cost-benefit' arguments to the contrary would be callous, unethical and a gross human rights violation.

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ANNEXURE 22

Comments on the report prepared by a NGO 'Centre for Science and Environment' and submitted to the Director, I.A.R.I., New Delhi by Pesticide Manufacturers and Formulators Association of India vide their letter No. MFAI/ENDO/01-02 dated 22/10/2001

Sub:- Analysis of samples from Padre Village in Kasargode District of Kerala for Endosulfan residues.

- For validation of residue data, fortification and recoveries experiments of alpha, beta & sulphate isomers of Endosulfan on various food commodities and environmental samples have not been reported.

- Sulphuric acid clean up method has been reported in case of high fat contents substrate. Sulphuric acid clean up is used for the analysis of DDT & HCH residues and not for endosulfan residues as it gets degraded in contact with sulphuric acid.

- Alpha and beta isomers of Endosulfan start converting into Endosulfan sulphate in the environment within 5-to-6 days after its spray, but its residues (endosulfan sulphate) were not estimated.

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- Residues of total endosulfan (alpha and beta isomers) in butter, cashew, cow milk, fish, human milk, soil, spices, vegetables and water samples are reported in the range of 14, 54.11, 57.2, 28.24, 22.4, 35.16, 212.2, 31.24, 9.19 ppm respectively, which appear to be very higher side as compared to the residues data generated by the 17 Coordinated Center of AICRP on Pesticide Residues.

- Residues of endosulfan were not confirmed by GC-MS despite the fact that very high residues were reported.

- Date of sampling is not reported.

In view of above, it is suggested that a detailed study with respect to the residues of endosulfan on various food commodities and environmental samples in cashew nut plantation area or Padre village, Kasargode District of Kerala may be carried out by a Pesticide Residues Laboratory, which is equipped with most sophisticated instruments like GC, GC-MS and trained scientists.

K. L. Sharma
6/11/2021

S B Lakra
6/11/2021

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GOVERNMENT OF KERALA
SCIENCE, TECHNOLOGY AND ENVIRONMENT DEPARTMENT

Sasthra Bhavan, Patto
Thiruvananthapuram

No.12/07/B1/2001/STED.

Dated 26.07.2001

From

Dr Kamalakshan Kokkal
Principal Scientific Officer, STED

To

Shri Aravind Edamali
ESPAC, C/o.Kajambadi Nursing Home
Perla 671 552

Sir,

Government have noticed media report on the spreading of unusual diseases among the inhabitat of Padre Village of Enmakaje Grama Panchayat of Kasaragod District. The reports have blamed the aer spraying of pesticides using helicopter by the Plantation Corporation of Kerala Ltd

And whereas Government were pleased to constitute an expert committee to study and submit status report in the matter vide G.O.Ms.39/2001/STED dated 15.05.2001 of Science, Technology a Environment (B) Department.

And whereas the Committee, as a fact finding team, like to have your valuable opinion in the matte You are requested to present your arguments before the committee on 7.08.01 at 12.00 Noon in the T.B Pulikunnu, Kasaragod.

If you are genuinely interested to co-operate with the investigations of the team, kindly go throu the attached questionnaire and state your opinion without any prejudice.

Thanking you,

Yours sincerely,

Kamalakshan Kokk

For the Expert Committ

QUESTIONNAIRE

PART I

1 Do you think that unusual diseases affect Padre village and surrounding area

☐ Yes ☐ No

2 In your opinion , is there any pollution problems in Padre Village

☐ Yes ☐ No

3 Are you aware of the media reports regarding the spreading of unusual diseases in Padre village

☐ Yes ☐ No

4 Do you agree that it is only a media publicity propaganda

☐ Yes ☐ No

5 Had any problem reported preciously?

☐ Yes ☐ No

If your answer is **'yes'** to majority of the questions, please go on to Part II

PART II

6. Whom do you suspect to be the actual culprits behind such a situation

☐ Agriculturists ☐ Plantation Corporation of Kerala ☐ Local Panchayath ☐ No opinion

7. Which of the following may be the pollutant causing such a harm

☐ Fertilycers ☐ Pesticides ☐ Not known

8. In your opinion, which of the following is widely used in the area.

☐ Furidan ☐ BHC ☐ Endosulfan

9. How can you know if somebody is going to conduct aerial spraying of pesticides in the area

☐ News Papers ☐ Notice in Public places ☐ Mike announcement ☐ All these

10. What time is selected for aerial spraying of pesticides

☐ Early morning ☐ Late night ☐ Early morning & late night ☐ No fixed time

If you like to add anything more, please go on to Part III

Part III

11. Why do you think that the aerial spraying of endosulfan results in the spreading of unusual diseases?

12. Since the pesticide may reach our environment even from the aerial spraying practiced in hinterlands, can it be a resultant of activities carried out in the nearby State If not so, Why?

13. When are the unusual diseases reported (as far as you can identify) and on what grounds it can be related to the endosulphan spraying.

14. Whatever endosulphan is sprayed in the estates, it is said as"only for the protection of cashew plantation during flowering and fruiting season". On one side we want more productivity and on the other, the environmental impacts of the pesticide spraying are unaffordable. At this stage, what do you practically suggest for more productivity with out any health hazards?

15. Do you contradict a statement that 'spreading of unusual diseases are noticed even in areas where endosulphan spraying is not practiced and the reported unusual diseases are not predominant in all areas where the endosulphan spraying is practiced.' - If so, substantiate your statements.

16. Are you aware of the guidelines issued by the National Research Centre for cashew, State Agricultural Department, Pollution Control Board and the District Collector on the aerial spraying of pesticides. If so, in your opinion, are they satisfactory. If not satisfactory, whatever conditions are else required.

17. Whether all the conditions stipulated by appropriate authorities are followed by PCK Ltd. during aerial spraying? If not, Why?

18. Are you willing to co-operate with the fact finding committee of Scientists appointed by the Kerala Government If so, whatever facilities can be extended by you

19. Have you ever noticed any leaching out of the spray solution to the ponds and other water sources. If so, give details.

20. Can you point out the victims of endosulfan aerial spraying. If so give full address of them.

21. Do you think that this questionnaire is satisfactory as far as a fact-finding team is concerned? If not, state any other matter you may like to inform.

Place: Name and Address
Date:

NATIONAL INSTITUTE OF OCCUPATIONAL HEALTH

(Indian Council of Medical Research)

HEALTH CHECK-UP FOR SCHOOL CHILDREN IN KASARAGODE

Please put a circle wherever appropriate

P1. Date of Interview ☐☐ ☐☐ ☐☐☐☐ **P2**. Individual ID ☐☐☐☐☐

P3. Name _____

P4. Date of Birth ☐☐ ☐☐ ☐☐☐☐ (Cross check from school record)

P5. Age (if date of birth is not available)

P6. Family ID ☐☐☐☐☐

P7. Sex Male Female

P8a Name of the School _____

_____

P8b. Standard in which studying ☐☐

P8c. Have you been retained in any class Yes No

If Yes, give details _____

P8d. Teacher's Remarks

Academic Ranking : Good Average Poor

Learning Disability : Yes No

Behaviour :

Normal Arrogant Restless Aggressive Attention deficit

P9. **Residential Address** (Name of the village, house no., ward & location of the house in the village)

_____

_____

P10. **Have you ever worked in the cashew nut plantation during your vacation or otherwise?**

Yes No

If yes

Year	Duration	
	Months	Days

C. CLINICAL HISTORY

The examining physician should record the presence or absence of each symptom and its duration and explore further history to give any provisional/possible diagnosis for each symptom complex after clinical examination.

C1. Present History

Do you suffer from any of the following symptoms (put a √ mark in the column yes or no)

Symptom	Yes	No	If yes, duration		
			Years	Months	Days
C1a. Cough					
C1b. Expectoration					
C1c. Breathlessness					
C1d. Palpitation					
C1e. Convulsions					
C1f. Frequent cold and coughs					
C1g. Jaundice					
C1h. Skin problem					
C1i. Any other Symptom					

C2. Past History

Did you suffer from any of the following symptom(put a √ mark in the column yes or no)

Symptom	Yes	No	Duration.		
			Years	Months	Days
C2a. Cough					
C2b. Expectoration					
C2c. Breathlessness					
C2d. Palpitation					
C2e. Convulsions					
C2f. Frequent cold and Coughs					
C2g. Jaundice					
C2h. Skin problem					
C2i. Any other symptom					

C3. Describe any other symptom if present try also to give probable diagnosis :

_____

_____

_____

C4. History of hospitalization

C4a. Have you ever been hospitalized

Yes No

If yes, the reason for hospitalization _____

C4b. Duration of hospitalization ☐☐ Days / weeks / months

C4c. Name of the hospital

C4d. Any case papers available Give details

G. PHYSICAL EXAMINATION

G1. ANTHROPOMETRY

G1a. Height(Cm.) ☐☐☐

G1b. Weight (Kg.) ☐☐☐

G1c. Head circumference (Cm.) ☐☐☐

G1d. Skin fold thickness over triceps (mm). ☐☐☐

G2. GENERAL EXAMINATION

G2a. B.P. Systolic ☐☐☐ **G2b.** Diastolic ☐☐☐

G2c. Anemia Yes No **G2d.**Oedema Yes No

G2e. Nails **G2f.** Teeth

G2g. Lymphadenopathy **G2h.** Eyes

G2i. Tongue **G2j.** Goitre

G3. Respiratory system

Normal Abnormal if abnormal, Give details below

_____

_____

G4. Cardiovascular system

Normal Abnormal if abnormal, Give details below

_____

_____

G5. Musculoskeletal System

Normal Abnormal if abnormal, Give details below

_____

_____

G6. Skin

Evidence of allergy Yes No Give details

_____

G7. Vision

G7a. Acquity **RE** **LE**

G7b. Squint Yes No

If yes, describe _____

G8. Hearing Problems Yes No

If yes, confirm by Rinne's Test

G9. Mental status (IQ)

Score in Draw a Man Test

SM. SEXUAL MATURITY RATING (SMR)

SM-G. PROFORMA FOR GIRLS

SM-G1. Menstrual history :

SM-G1a. Do you menstruate? Yes No.

If yes, answer following questions

SM-G1b. Age at menarche _____ (record date, month and year, if available)

SM-G1c. Duration : (No. of days) ☐☐

SM-G1d. Flow : Normal Excessive

SM-G1e. Cycle* : Regular Irregular (give details)

(*1st day of the period to the 1st day of the next period)

SM-G1f. L.M.P. (1st day of the last menstrual period) (Enter date) _____

SM-G2. SMR RATING OF MARSHALL AND TANNER – CLASSIFICATION OF SMR IN GIRLS

(put a √ mark in the appropriate box)

SMR	Pubic Hair		Breasts	
1.	Preadolescent	☐	Preadolescent	☐
2.	Sparse, lightly pigmented straight, medical border of labia	☐	Breast and papillae elevated as small mound; areolar diameter increased	☐
3.	Darker, beginning to curl, increased amount	☐	Breast and areola enlarged, No contour separation	☐
4.	Coarse, curly, abundant but amount less than in adult	☐	Areola and papillae form secondary mound	☐
5.	Adult feminine triangle, spread to medial surface of thighs.	☐	Mature, nipple projects, areola part of general breast contour	☐

SM-B. PROFORMA FOR BOYS

SM-B1.CLASSIFICATION OF SEX MATURITY STAGES IN BOYS

(put a √ mark in the appropriate columns)

SMR Stage	Pubic hair		Penis		Testes	
1	None	☐	Preadolescent	☐	Preadolescent	☐
2	Scanty, long, slightly pigmented	☐	Slight enlargement	☐	Enlarged scrotum, pink texture altered	☐
3.	Darker, starts to curl, small amount	☐	Longer	☐	Larger	☐
4.	Resemble adult type, but less in quantity, coarse, curly	☐	Larger, glans and breadth increase in size	☐	Larger, scrotum dark	☐
5.	Adult distribution, spread to medial surface of thighs	☐	Adult size	☐	Adult size	☐

SM-B2. Testes size in mm.

(measured by Orchidometer) Left ☐☐ Right ☐☐

CM. CONGENITAL MALFORMATIONS

CM1. Skeletal Yes No

If yes, describe _____

CM2. Hypospadias Yes No

If yes, Mild Moderate Severe

CM3. Cryptorchidism Yes No

CM4. Congenital Cardiac disease Yes No

If yes, describe _____

CM5. Neural Tube defects Yes No

If yes, describe _____

D. ON THE BASIS OF HISTORY AND CLINICAL EXAMINATION, PLEASE GIVE PROVISIONAL DIAGNOSIS (Please put a circle wherever appropriate)

D1. Bronchial asthma	Yes	No
D2. Allergic dermatitis	Yes	No
D3. Congenital Malformations	Yes	No
D4. Neurological problems	Yes	No
D5. Cancer	Yes	No
D6. Hormonal imbalance	Yes	No
D7. Does the child need further referral	Yes	No

If yes, which speciality (put a circle around)

Neurologist **Psychologist** **Oncologist**

Dermatologist **Endocrinologist**

Investigations carried out and dates

1. **Cytogenetic testing**
2. **Endosulfan residue in blood**
3. **Hormonal analysis**

Name of the Pediatrician :

Name of the assistant :

Supervisor :

Any Remarks :